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ABSTRACT

Designed as a special continuing education program for rehabilitation professionals, this document is divided into five lessons. Lesson 1, "Technology Assessment: Determining the Needs" (Ricardo G. Cerna), includes discussion on technology assessment and determining the needs of the clients as well as different types of assistive technology that may be employed. Lesson 2, "Assistive Technology and Rehabilitation Counseling" (Chow S. Lam, Charles Merbitz, and Fong Chan), offers information regarding rehabilitation engineering, rehabilitation technology and assistive technology. Lesson 3, "Low-Cost Technology Options for ADA Compliance" (Barry L. Oakes), was designed to offer specific instructions to guide maintenance workers and even nontechnical persons in cost-effectively complying with ADA regulations in the area of building modifications. Lesson 4, "Maximizing Use of Assistive Technology" (Aimee J. Leubben), aims to help decrease the incidence of underused assistive technology devices by outlining an evaluation process for determining client need. Finally, Lesson 5, "Ethical Considerations in Rehabilitation and Technology" (Ruth B. Purtilo), is designed to help the counselor better understand ethical issues in the use of rehabilitation technology. (BF)

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# Rehabilitation Technology Review

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Professional Advancement Series

Presented by *Directions in Rehabilitation Counseling*

# REHABILITATION TECHNOLOGY REVIEW

*Rehabilitation Technology Review*, a special continuing education program for rehabilitation professionals, is published under the auspices of *Directions in Rehabilitation Counseling*.

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# Rehabilitation Technology Review

LESSON 1

# Technology Assessment: Determining the Needs

**Ricardo G. Cerna, MS**

Mr. Cerna is President of Cerna & Associates, a rehabilitation consulting firm based in Edgerton, WI.

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## KEY POINTS

- As the dramatic growth in high and low technology and its ability to improve all facets of life for disabled persons continue to grow, it becomes increasingly important for rehabilitation professionals to be adept in all aspects of client evaluation, technology assessment, and resultant implementation of appropriate strategies.

- Seven fundamental assumptions underlie the application of rehabilitation engineering to assistive technology: (1) Rehabilitation technology is better applied by an interdisciplinary approach as opposed that of to any one specialist; (2) coordinated approach is critical; (3) the ultimate success of a technological adaptation rests with the client; (4) results vary proportionately with quality of services obtained and their relevance to identified needs; (5) the continuing maturation of rehabilitation technology requires adequate human and fiscal resources; (6) the most appropriate use of technology may, in fact, be a decision not to use it; and (7) clients relate to, accept, and adapt to technological tools based on individual differences regarding perceived personal benefits and lifestyles.

- *Assessment* is general in nature; it refers to the collection of information about a specific person to make a decision. *Ecological assessment* addresses the issues in the relationship between the client and his or her immediate environment; it alone does not provide solutions to specific questions or problems.

- *High technology* involves electronics and other sophisticated equipment; it usually requires a person trained in that field to assemble and/or maintain it. *Low technology* relies on simple solutions that use mechanical principles and requires only simple hand tools and easy-to-locate materials for construction.

- The key question in any assessment is, "Why is this assessment being performed?" When performing an assessment, it is imperative to examine the client, the environment, and the equipment. The first step is to identify what the client **can** do; then, look at what can be done differently. Considering what the client would like to do is helpful as well. It is important to perform the evaluation in the environment where the task is to be performed.

*When the only tool you have is a hammer, you tend to see every problem as a nail.*

Abraham Maslow

**The dramatic growth in technology is improving access to all facets of life for both disabled and nondisabled persons.** For the person with a disability, access to medical services, education, training, work, recreation, and independent living can be the difference between being a less productive, dependent person and an independent, more productive member of society.

**Both low and high technologies will have an impact not only on the services to persons with disabilities but also on the extent of those services.** However, technology alone is often not a final solution. **A plan or strategy for the use of technology must be developed. The plan should include proper training in the use of technology for the user *and* his or her support people. Also, the plan should consider funding, maintenance, and possible replacements or upgrading.** What may have been perceived as a technological answer to a problem, such as a communication device for a nonvocal person, may introduce that person to opportunities in education, training, and employment. This is turn may require additional technologies.

**What are these technologies and what can we look for in determining the technological needs of a disabled person?** This section will introduce the concept of assistive technology and demonstrate how it can be provided to help enhance the lives of persons with disabilities. This is not intended to be a "cookbook" approach to the application of technology. It will, however, provide a framework to help identify the technological needs of persons with disabilities.

## Fundamental Assumptions

In 1986, a prime study group of rehabilitation professionals working in the area of rehabilitation technology participated in the 13th Institute on Rehabilitation Issues. Their study was a year-long process that brought together their expertise in the area of technology applications. During the course of their work, **the group members defined seven fundamental assumptions regarding rehabilitation engineering.** These assumptions hold true today for the application of assistive technology. The assumptions as defined by the group are:

- **Rehabilitation technology is better applied by an interdisciplinary team than by any one specialist working in isolation.**
- Anyone can be the catalyst, but **the presence of a single, coordinated approach is crucial.**
- **The final decision and responsibility for the success of an approach rest with the client.**
- **Results obtained will vary proportionately with the quality of services obtained and their direct relevance to the needs identified.**
- **Development of expertise in rehabilitation technology is an ongoing activity for which adequate human and fiscal resources must be budgeted.**
- **The most appropriate use of technology may be a decision not to use it.**
- **Clients relate to, accept, and adapt to technological tools based on individual differences regarding perceived personal benefits and lifestyles.**[1]

Roth[2] made a plea for the use of technology to achieve substantial gains for persons with disabilities. He also pointed out that those who do not learn from the present may be condemned to live in the past. If these persons are influential in the lives of others, they may in turn condemn others to live in the past as well. The simple thought that a small number of persons may be condemning a much larger number of persons with disabilities to live in the

past is indeed frightening. It would appear, then, that another assumption we need to consider is: **those who work with persons with disabilities must be willing to accept technology as one of the means of achieving the goals set forth in a person's plan.**

## Assessment

Assessment has been defined as the **process of collecting information to make a decision about how to proceed**. We are constantly assessing our situations throughout our lives, whether it be at home, work, or elsewhere. For example, when we enter our car, we check the gas gauge to assess our fuel situation and decide whether to purchase fuel soon or later. When the assessment focuses on a person, we are doing the same. **That is, in a personal assessment, we collect information about a person to make a decision about what to do next.**

**In human services, the term *functional assessment* is often used to describe the abilities and behaviors the person exhibits during various life activities.** Rehabilitation professionals have used functional assessment techniques for many years. Although it is not a new approach, what is new is the consideration of the environment in conjunction with the necessary tools and equipment used to perform a specific function. **For the purposes of this lesson, functional assessment refers to the evaluation of performance capacity for any identifiable task whether the task is related to work or not.**

Determining the assistive technology needs of persons with disabilities goes beyond performing a functional assessment. **In determining the technology needs of a person, we need to consider the total environment in what can be described as an ecological assessment, which considers the relationship between the individual and his or her environment.** It considers not only the functional aspects of the client but also the environment in which the person must function and the tools and equipment needed to perform a specific function. **The assessment is not performed in terms of whether a person can or cannot do a task, but in terms of what the person needs in order to perform that task.** The person's needs may involve the use of a different approach or different tools, or modifications to either or both.

**An ecological assessment is not any analysis performed by one person; rather, it should be a team effort. The client (person for whom the assessment is being done), significant partners (parents, partners, classmates, friends, coworkers, etc.), medical representatives, counselor(s) (social worker, vocational counselor, school counselor), teacher(s), job coach(es), and employer(s) all should be involved.** Although it may not be practical or essential to assemble all of these potential team players in a face-to-face meeting, the information they contribute about the client should be considered. And although there are no rules on whom to select as team leader, he or she should be someone who will take the needed action to see that the assessment is performed.

Before we examine the areas that need to be covered in an ecological assessment, **clarification must be made on the differences between assessment and ecological assessment. Assessment is general in nature.** It means gathering information about a specific client to make a decision. The decision may be a single action or one in a series of decisions that are needed to implement a plan.

**Ecological assessment addresses the issues in the relationship between the client and his or her immediate environment. It looks at a specific client, considering his or her abilities and behaviors and identifying the environmental needs (including tools and equipment) to do an identifiable task, whether the task is work-related or not.**

**An ecological assessment alone does not provide solutions to specific questions or problems.** It does, however, provide clarification of individual performance needs in accomplishing a specific task. **Any identified barriers can then be analyzed to see if they can be overcome by an accommodation or with technology. An accommodation is a change to the environment and/or the equipment to fit the needs of the person being evaluated.** Accommodations take **many forms**; they can involve a change or a series of changes and adaptations.

## Assistive Technology

When the word "technology" is invoked, different definitions may come to mind. Technology is omnipresent, and most of us use it throughout the day. To some, technology means "state-of-the-art"; however, as already emphasized, it can be either high or low technology. **High technology is technology that involves electronics and sophisticated equipment; it usually requires a person trained in that field to assemble and/or maintain it.** Technologies in this category include (but are not limited to) computers, robotics, electronic equipment, etc. **Low technology, on the other hand, is technology that relies on simple solutions that use mechanical principles and require only simple hand tools and easy-to-find materials to construct.** Technologies in this group include (but are not limited to) ramps, lever handles, and the like.

Technology can be applied to many daily activities in which we engage. The technology we use often enhances or facilitates our performance. In the same manner, persons with disabilities can benefit from technology. If the technology is more specifically tailored to their individual needs, it will enhance or facilitate their performance and may remove barriers that otherwise prevent the disabled person from performing a task. For example, a person who cannot walk may be able to use a manual wheelchair to overcome a limitation in mobility. If the person cannot use a manual wheelchair, it may be possible that a powered wheelchair will provide him or her with that independent mobility. In any case, the outcome of the application of technology is that it will facilitate or enhance performance.

**The field of technological services for persons with disabilities is quite broad and extremely young.** It has emerged from several different disciplines and in response to different needs. Some of these disciplines are traditional and well established, with well-defined areas, such as prosthetics and orthotics. Others represent emerging disciplines, such as surgical implants and robotics. Some are technologies in themselves; e.g., switches and controls.

Because of the recent interest in technology as a service to persons with disabilities, how we define technology is critical. Do we mean the application of science, the methods or materials used, or the application of products to help an individual? The different definitions applicable here should be examined.

- ***Technology*: "The sum of the ways in which a social group provides themselves with the material objects of their civilization."**[1]
- ***Rehabilitation technology*: "Compensatory strategies and adapted equipment used to increase, maintain, or improve functional capabilities of persons with disabilities."**[1]

The 1986 reauthorization of the Rehabilitation Act placed emphasis on the provision of technology as a means of helping disabled persons gain or maintain employment. The Rehabilitation Act referred to this as rehabilitation engineering.

- ***Rehabilitation engineering*: ". . . the systematic application of technologies, engineering methodologies, or scientific principles to meet the needs of and address the barri-**

**ers confronted by individuals with handicaps in the areas which [*sic*] include education, rehabilitation, employment, transportation, independent living, and recreation."**[1]

The Technology-Related Assistance for Individuals with Disabilities Act[2] (the "Tech Act") was passed by Congress in 1988. This act established the terminology of "assistive technology services" and "assistive technology devices" to refer to the broad range of services and devices. The Tech Act introduced the following legislative definitions:

- ***Assistive technology device*** **[is] any item, piece of equipment or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.**[3]
- ***Assistive technology service*** **is any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology service. Such a term includes:**
  - **Evaluation of the technology needs of the individual, including a functional evaluation in the individual's customary environment**
  - **Purchasing, leasing, or otherwise providing for the acquisition of assistive technology devices for individuals with disabilities**
  - **Selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing, or replacing of assistive technology devices**
  - **Coordinating and using other therapies, interventions, or services with assistive technology devices, such as those associated with existing education and rehabilitation plans and programs**
  - **Assistive technology training and technical assistance with assistive technology for an individual with a disability, or, where appropriate, the family of an individual with disabilities**
  - **Training or technical assistance for professional, employers, or other individuals who provide services to, employ, or otherwise are substantially involved in the major life functions of individuals with disabilities.**[4]

To avoid confusion with regards to multiple terms for assistive technology, the Rehabilitation Act Amendments of 1992 state that the term *rehabilitation technology* should be used to encompass other terminology. The Senate report states, "The Committee recognizes that several terms are used in the field to connote activities related to technology design and utilization, including rehabilitation engineering, assistive technology devices, assistive technology services and rehabilitation technology." **The committee decided to use the term *rehabilitation technology* to reflect all activities previously incorporated under the term *rehabilitation engineering* and clarifies that the term includes assistive technology devices and assistive technology services.**[5]

The definition of rehabilitation technology put forth by the 13th Institute on Rehabilitation Issues includes *compensatory strategies* as a technology. It is important to keep this in mind because it is often a strategy that allows a person to be able to use technology in a way that will provide the most benefits.

## Areas to Consider

**What do we mean when we speak of performing an assessment of a client? Are we assessing only that person? Are we considering his or her ability to function in a particular environment? Can we use traditional vocational evaluation or work adjustment?**

Traditional evaluation methods often do not work for persons with severe disabilities, most likely because of the standardization of tests and work samples. Another reason may be that vocational evaluation (and to a certain extent work adjustment) are based on performance. However, other evaluation methods such as situational assessment, job site evaluation, and close behavioral observations are available. **The key question is: Why is this assessment being performed?**

For employment, the required information must be specific to the available jobs in the community and within the commuting radius of the client. For activities of daily living, the required information must be specific to those activities. Observation of activities should be done at the actual work site or location where the activity (social or personal) occurs. The observations should focus on the natural cues of the client as he or she performs the activities.

**When performing an assessment to determine the technology needs of a client, it is important to look closely at three distinct areas.**

- **The client**
- **The environment (accessibility)**
- **The equipment (job or activity tools)**

The rehabilitation professional should not expect to know everything. However, he or she should know who to call for help. As mentioned before, performing an assessment is often a team effort. Who should be included in this team? There is no set number of persons for a team. However, there are key persons who should be involved. These include the client being evaluated, significant partners, teachers, trainers, job coaches, therapists, employers, and any other person who is to be part of the environment where the individual being evaluated is going to function.

## THE CLIENT:

When performing an assessment, look for information already available. Determine whether or not this information is current. Obviously, if the information is not current, it should be updated.

**The first step is to identify what the client *can* do. Once this has been determined, the next step is to look at what can be done differently** for those tasks that the person cannot do. In carrying out the assessment, use all existing resources and do not hesitate to explore ideas with others who might be able to help.

**Never overlook the most important team member—the person being evaluated.** There are times when it will appear evident what type of technology would help a certain person with a disability. The technology needs in certain cases may appear obvious. For example, a person with cerebral palsy who has difficulty vocalizing might benefit from a communication aid that he or she could operate. However, that person may not want to use a communication aid, and may prefer to vocalize as best as he or she can. **The purchase of an electronic communication aid with speech synthesis may be worthless if the person prefers not to use it.**

**It is important that the person who is going to use the technology offer input regarding the proposed technology or the technology that they feel is best for them. Technology abandonment is a major problem and is not cost effective. It is important to keep in mind that changes happen only when the key persons, together with the person being evaluated, are accepting of differences in functioning and achievement.**

Another problem with "throwing technology at a problem" is the acceptance of the technology and its possible limitations. Although technology may enhance or facilitate the performance of a task, it may not perform

the task in the same manner that a nondisabled person might. Therefore, the person using that technology may need to accept its possible limitations.

**Body image is a vital consideration in accepting technology.** Consider a person who cannot use his or her hands or arms who needs to do keyboard entry. One low technology solution is to use a head-pointer, a stick that is attached to a head band and is placed on the head of the person. By moving his or her head, the person can use the stick to select and depress keys on a keyboard. However, the person may not feel comfortable wearing an adaptation that resembles a stick projecting out of his or her head.

We have available to us not only techniques for doing the assessment, but also the reports of other evaluations. Not all of these documents are readily available or have relevance to assistive technology or its needs. It may be necessary to obtain a "release of information" from the client or appropriate legal representative to view those reports. Some of these records or reports include:

- Medical, school, work, rehabilitation facility records (client/patient records)
- Diagnostic evaluations
- Medical communications
- OT/PT adaptive equipment needs
- Interviews of parents or caregivers
- Observations of client performance
- Activities of daily living
- Social activities
- Work activities
- Interviews of the person being evaluated

In evaluating the client, there are several things that should be considered. **Keep in mind that evaluating the client in isolation may not provide an adequate picture of his or her performance. Therefore, it is important that the evaluation be done where the task is to be performed.** It is also important to **identify the task(s) that the person needs to do or would like to do.**

*Sample Assessment of Technological Need*

1. **Isolate the task if there is more than one.**

   Opening a door is the task isolated for this example.

2. **What is it about the task that the person cannot do?**

   Turn the door knob, and

   Pull the door toward him or her.

4. **Assess whether the task can be done differently.**

   Is there a need for the door? If the door cannot be eliminated, what do we need to change?

5. **Can the door hardware (equipment) be modified or changed?**

   Use a level handle;

   Use two-way hinges to push the door from either side;

   Use a power door opener if the above will not work.

Although this example may seem to be an oversimplification of the problem, there is a need to identify and describe in detail what needs to be accomplished. The next step may be to consult with a technology specialist or a rehabilitation engineer.

## THE ENVIRONMENT:

Assessment of the physical setup is an evaluation of the environment in which the client is to function. **This assessment is used to determine how accessible an environment is for a particular person.** Although you should be concerned with total accessibility for everyone, in an ecological assessment you are focusing on a specific

person. Therefore, you need to focus primarily on the needs of the person being evaluated.

**The assessment of the physical setup should include the physical environment and the attitudes of those in that environment toward the person being evaluated. Attitudinal barriers are often more difficult to overcome** than physical or architectural barriers.

Physical accessibility permits a person with severe physical limitations to enter, circulate in, and use all the essential facilities in that environment, and exit without the assistance of others. There are persons with severe physical disabilities who will need assistance no matter how accessible the environment is. That assistance can come from either other persons or the use of assistive technology.

**An accessibility survey or physical setup assessment looks at the following areas:**

- **Parking and walkways**
- **Entrances**
- **Interior circulation (horizontal and vertical)**
- **Work area(s)**
- **Restrooms**
- **Lunch room**
- **Other facilities (meeting and recreation areas)**
- **Emergency facilities (fire exits, extinguishers, first aid kits)**

**It is crucial that the client be able to participate and use the facilities (environment) to the same extent as others in that environment.** The complete use of the environment is a matter of common sense. For example, in an office complex, if the executive restroom is not accessible, it should not be considered critical if none of the "regular workers" are allowed to use it. However, that would be a critical issue if the person being considered is indeed an executive.

## THE EQUIPMENT:

In everyday activities, when faced with a situation in which tools are required, we select from what we have at hand. We usually do not have the luxury of purchasing new tools and equipment every time we begin a new project. The same applies when evaluating the need for tools and equipment for a specific person. **We have to consider the person and his or her abilities and limitations to use the tools and equipment that are at hand.**

There are four basic considerations to apply when looking at the tools and equipment to be used by the client. These are:

1. **Can the person use the tools and equipment as is?**

   If not:

2. **Can the tools and equipment be modified?**

   If not:

3. **Can different, adapted tools and adapted (assistive) equipment be purchased?**

   If not:

4. **Can the needed tools and equipment be designed?**

**Keep in mind the cost effectiveness of the process. In many operations, the design and fabrication of a special fixture would be minimal. However, the design and fabrication of a new tool or piece of equipment is the most costly of the four considerations presented.**

**If you are uncertain if you can determine the technology needs of the client, consult an expert—a technology specialist or a rehabilitation engineer**. Private, for-profit companies or private individual practitioners in this field offer their services either on a contractual or consulting basis; the range of services provided and degree of expertise vary.

*Strategies*

Strategies are required to combine the equipment and service delivery with the instructions to achieve the best result. **The strategies developed include compensatory strategies,** which may call for the restructuring of tasks and or activities (and possibly the environment) to compensate for the functional limitations of the person with the disability. **Often, compensatory strategies do not involve assistive aids or other equipment;** however, the use of aids or assistive technology in conjunction with compensatory strategies can enhance the outcome. **Some examples of compensatory strategies include architectural modification, environmental modifications, job site modifications, medical care, attendant care,** and use of other ideas to help persons with disabilities become more productive in their environment.

**All-encompassing methodologies do not yet exist for prescribing and applying technology to benefit persons with disabilities.** This is most likely due to the relative newness of assistive technology programs, as well as the diversity of disabled persons and their needs. The need for a fully integrated service delivery system that includes not only the technology and methodology of application, but also funding and maintenance of that technology has been recognized by different individuals and organizations including RESNA, an interdisciplinary association for the advancement of rehabilitation and assistive technologies. RESNA has created special interest groups in a number of areas, including service-delivery methodology and resources.

## RESOURCES

It would be a monumental task to list all the resources available to service providers or to persons with disabilities. For the counselor who is interested in expanding his or her knowledge and resources on assistive technology, it is recommended that he or she consider joining RESNA or attending regional workshops or national conference. The following resources are offered as a preliminary guide and do not represent a comprehensive listing. No endorsements are intended.

**INFORMATIONAL RESOURCES:**

- County extension agent (agricultural needs)
- Electronics dealers
- Home health care agencies
- Hyper-ABLEDATA
  Trace Research and Development Center
  S-151 Waisman Center
  1500 Highland Avenue
  Madison WI 53705
  (608) 262-6966
  *[Hyper-ABLEDATA is a computerized database on assistive devices.]*
- Local welding or machine shop (fabrication needs)
- Private consultants
  (At present, there is no certification for consultants providing assistive technology consultation.)
- RESNA
  1700 North Moore Street
  Suite 1540
  Arlington VA 22209-1903
  (703) 524-6686
- SOLUTIONS
  Computerized database on adaptive computer software and hardware
  Closing the Gap
  (612) 248-3294
- State vocation rehabilitation agencies (rehabilitation needs)
- Technology equipment vendors (see equipment resources)
- Vocational teacher (high school, community college)
- Volunteer organizations (i.e., telephone pioneers)

**EQUIPMENT RESOURCES:**

***Catalogs***

Ableware — *Aids for daily living*
Maddak Inc
Pequannock NJ 07440-1993
(201) 694-0500

Deaf Products — *Hearing Impaired*
PO Box 2256
Costa Mesa CA 92628-2256
(714) 549-5123—Voice/TDD

Enrichments Inc — *Aids for daily living*
PO Box 579
Hinsdale IL 60521
(312) 325-1625

Fashion Able — *Aids for daily living*
Maddak Inc
Pequannock NJ 07440-1993

Independent Living Aids — *Vision and other aids*
11 Commercial Court
Plainview NY 11803
(516) 957-8390

Maxi Aids — *Aids for daily living*
86-30 102nd Street
Richmond Hill NY 11418

Prentke Romich — *Communication aids*
1022 Heyl Road
Wooster OH 44691
(216) 262-1724

Science Products Resource Guide — *Vision aids*
Box A
Southeastern PA 19399

UltraTec — *Hearing-impaired*
6442 Normandy Lane
Madison WI 53719
(608) 273-0707—Voice/TDD

ZYGO Industries — *Communication aids*
PO Box 1008
Portland OR 97207
(503) 297-1724

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4. Public Law 99-506. Technology-related assistance for individuals with disabilities act of 1988. Vol 102 of Statutes at Large; 1988.
5. Public Law 100-407. Technology-Related Assistance for Individuals with Disabilities Act of 1988. Vol 102 of Statutes at Large; 1988.
6. Senate Report 102-357. Rehabilitation Act Amendments; 1992.

## QUESTIONS BASED ON THIS LESSON

1. According to the assumptions regarding rehabilitation engineering put forth by the 13th Institute on Rehabilitation Issues:

   A. Rehabilitation technology is better applied by an interdisciplinary team than by any one specialist.

   B. Results obtained vary inversely with the quality of services obtained and their relevance to any identified needs.

   C. Most assistive technology currently on the market is too complex for the average client and must be dramatically simplified to be useful.

   D. The decision not to use a specific technology is always an inappropriate use of technology.

2. Functional assessment:

   A. Addresses the issues in the relationship between the client and his or her immediate environment.

   B. Refers exclusively to just the gathering of information about a specific person to make a decision.

   C. Describes the abilities and behaviors a particular person exhibits during various life activities.

   D. Is only used to evaluate work-related tasks.

3. Which of the following statements about relatively recent Congressional legislation is false?

   A. The 1986 reauthorization of the Rehabilitation Act removed a provision of the original Act that placed emphasis on helping disabled persons gain or maintain employment.

   B. The Technology-Related Assistance for Individuals with Disabilities Act established the terminology of "assistive technology services" and "assistive technology devices" to refer to a broad range of services and devices.

   C. The Rehabilitation Act Amendments of 1992 state that the term *rehabilitation technology* should be used to encompass other terminology.

   D. The Technology Related Assistance for Individuals with Disabilities was passed by Congress in 1988.

4. According to the author:

   A. The key question regarding any assessment is *Why is the client unable to perform a certain function?* rather than *Why is this assessment being performed?*

   B. It is, in fact, not important to perform the evaluation in the environment in which the task is to be performed.

   C. The first step in an evaluation is to identify what the client can do.

   D. Body image is completely irrelevant in accepting technology.

# REHABILITATION TECHNOLOGY REVIEW

LESSON 2.

# Assistive Technology and Rehabilitation Counseling

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Professional Advancement Series

Presented by *Directions in Rehabilitation Counseling*

## KEY POINTS

- Recent advancements in computer technologies have enabled rehabilitation engineers to develop useful and sophisticated electronic assistive devices for persons with disabilities. This *assistive technology* covers areas such as accessibility, seating, mobility, augmentative communication, environmental control, computer access, home modification, and work station modification.

- *Rehabilitation engineering* is "the systematic application of technologies, engineering methodologies, and scientific principles to meet the needs of, and address the barriers confronted by, individuals with handicaps in areas which [*sic*] include education, rehabilitation, employment, transportation, independent living, and recreation."

- *Rehabilitation technology* encompasses "compensatory strategies and adaptive equipment used to increase, maintain, or improve functional capacities of persons with disabilities."

- *Assistive technology* involves the application of technology to the lives of disabled persons without the implication of being exclusive to engineering or medical settings.

- When attempting to make an informed decision about an assistive technology device, it is necessary to gauge *functional utility* (what does it really do?), *level of technology* (how complicated is it?), *competition* (how different and how much better is it than similar devices?), *clinical base* (how is it prescribed, if at all?), *peer approval, formal evaluation* (what type of evaluation has the device undergone?), *distribution* (is it in stock or is it made to order?), and *maintenance* requirements.

- With various federal mandates (from the Amendments to the Rehabilitation Act [1986], the Technology-Related Assistance for the Individuals with Disabilities Act [1988], the Americans with Disabilities Act [1990], and the Amendments to the Technology-Related Assistance for the Individuals with Disabilities Act [1992]), rehabilitation professionals have no choice but to involve themselves in the delivery of assistive technology.

- In addition to federal legislation, increased survivorship (thanks to medical advances) and the growing ranks of the elderly (who use proportionally more rehabilitation services than their younger cohorts will necessitate further development and innovation in rehabilitation services and assistive technology in years to come.

## Introduction

**Recent advancements in microelectronic and computer technologies have enabled rehabilitation engineers to develop useful and sophisticated electronic assistive devices for persons with disabilities.** Technology allows those with disabilities to improve their "capacity to carry out activities of daily living and employment." **The technology used in this pursuit is called "rehabilitation technology," and, more recently, "assistive technology."**[1] Assistive technology (especially in augmentative communication, environmental control, and robotics) can be extremely successful in enhancing the quality of life at home and in the work place for disabled persons. The widespread application of rehabilitation technology and compensatory strategies undoubtedly will enhance rehabilitation outcomes for disabled persons.

## Legislation

Several pieces of legislation have helped expand the field of assistive technology. **The 1986 Amendments to the Rehabilitation Act**[2] **mandated that rehabilitation engineering services be made available to state vocational rehabilitation clients.** This mandate has been addressed in a variety of ways, from the establishment of contracts with private service providers to the hiring of rehabilitation engineers by state agencies.[3] The Technology-Related Assistance for Individuals With Disabilities Act of 1988,[4] also known as the "Tech Act," has enabled some states to obtain funding for improved public access to assistive technology. Implementation of this mandate has varied between states, offering such components as awareness training, service delivery, and loan programs for the procurement of devices. **The legislation with the most impact, however, is the Americans with Disabilities Act**[5] **(ADA), which protects the rights of persons with disabilities to access of services and to have equal opportunity for employment and promotion.**

## Terminology

Because rehabilitation technology is a new area, changes occur constantly. We will define some common terms to help readers become familiar with the field. ***Rehabilitation engineering***, a term used in the 1970s and early 1980s, means the **"systematic application of technologies, engineering methodologies, and scientific principles to meet the needs of, and address the barriers confronted by, individuals with handicaps** in areas which [*sic*] include education, rehabilitation, employment, transportation, independent living, and recreation."[6] ***Rehabilitation technology***, a revised term used during the mid- and late-1980s, can be defined as **"...compensatory strategies and adaptive equipment used to increase, maintain, or improve functional capacities of persons with disabilities."**[1] ***Assistive technology*, the latest term used to describe the field, is the application of technology to the lives of persons with disabilities without the implication of being exclusive to engineering or medical settings. Assistive technology often makes it possible for a disabled person to join the work force and increase his or her independence.**

## Areas of Assistive Technology

According to Hedman,[3] areas typically considered as part of assistive technology include:

- **Accessibility**
- **Seating**
- **Mobility**
- **Augmentative communication**

- **Environmental control**
- **Computer access**
- **Home modification**
- **Work station modification**

Under the ADA, employers are required to provide "reasonable accommodation" to those with disabilities to facilitate their work performance. In many cases, employers may be required to acquire or modify equipment or devices needed for employment.

**Hedman[3] points out that although the areas of accessibility and work station modification are obviously applicable to work station accommodation, other assistive technology areas may be applied to the work environment as well.** For instance, seating may have a physical effect on everything a worker does. Specialized seating features may be found on commercially available chairs or may be applied to a wheeled-mobility base. Environmental control units can allow someone with limited function to control several electronic devices within a work site. Augmentative communication equipment may be used by a person who relays information at work, or when dealing with customers. Home modifications are often examined to enable a person to leave home for work, and to be able to perform such activities of daily living as dressing, eating, and bathing in order to address employment goals more effectively.

The vast amount of adjustable equipment available for ergonomic set-up of work stations, such as specialized office chairs and computer desks, is commercially available, as are the mini-keyboards that enable a person with limited range of movement to access all computer keyboard elements. **In some instances, accommodation may require custom-designed or custom-fabricated equipment.** Each job and each person's abilities are unique, which may require new equipment to be introduced into the work place. No matter how the modification is made, the intervention often brings with it the added benefits of **increased safety and productivity for the disabled person**.

## Making Informed Choices About Assistive Technology

**During the past 10 years, the number of assistive devices on the market has nearly tripled.** This rapid growth of technology makes it **difficult for the public to keep abreast of new developments**. Furthermore, even for knowledgeable consumers, barriers to appropriate selection, acquisition, and usage often exist. Knowing which device to choose may be confusing, both for consumers and service providers. The following guidelines developed by the Southwest Research Institute's Rehabilitation Engineering Center may help to guide attempts to match technology to the needs of a disabled person.[4]

### FUNCTIONAL UTILITY:

**What does the device really do?** Many times, a developer or manufacturer will inflate the potential impact of a new product and present it as more than it really is. To make an informed decision, you will need to **find out not only the things it does, but the things it cannot do as well**. It is always prudent to **ask for a demonstration with the client**.

### LEVEL OF TECHNOLOGY:

**How complicated is the device?** Not all technology is "high tech." Many new products involve a level of technology that is familiar to laypeople, so it is easy to form an opinion about the quality of design and manufac-

ture of the product. **For sophisticated devices, ask for a description in plain language** if the technical jargon that is being used to describe the product is beyond your comprehension. Ask how difficult it is to learn how to use the device. Quite often, **a device that is complicated to operate will soon be abandoned by the user**, even though it might do its intended job effectively.

#### COMPETITION:

**Is the device similar to something the client is already using?** If so, make sure to compare the performance of the two devices on an equal basis, so as not to make an invalid comparison. When a new product is introduced with claims of radical difference, **keep a healthy level of skepticism and try to find out *how different* or *how much better* the product can be and still embody the positive attributes of the one it is supposed to replace.**

#### CLINICAL BASE:

**How is the device prescribed, or is a prescription even necessary?** Frequently, the professional judgment of a physician, therapist, prosthetist, or engineer should be sought when considering a new device. If the device is indeed new to the market, there will probably be few clinical facilities in which the device is actively being prescribed, fitted, or evaluated. **You must know where the nearest recognized clinical facility is and with whom you should talk for information. Even if a prescription is not required, it would be prudent to consult with an unbiased professional.**

#### PEER APPROVAL:

**Who else is already using the device?** You should talk to somebody who has experience using it and discover what he or she likes and dislikes about the equipment. It is important not only that the device functions as it is supposed to, but also that it looks acceptable to the user as well as family, friends, and coworkers.

#### FORMAL EVALUATION:

**What type of evaluation has the device undergone?** Many times, a new product is launched before it has been thoroughly tested. You need to know whether the product really does what it was intended for, safely and reliably. Do not take only the vendor's word for it. **Ask for proof.**

#### DISTRIBUTION:

**Where is the device being sold?** You need to know whether the device is **in stock or made to order**. If it is made to order, you have to ensure that it can be returned if it does not function or fit according to specifications. If training is needed to operate the device, you need to find out training costs, time, and training personnel.

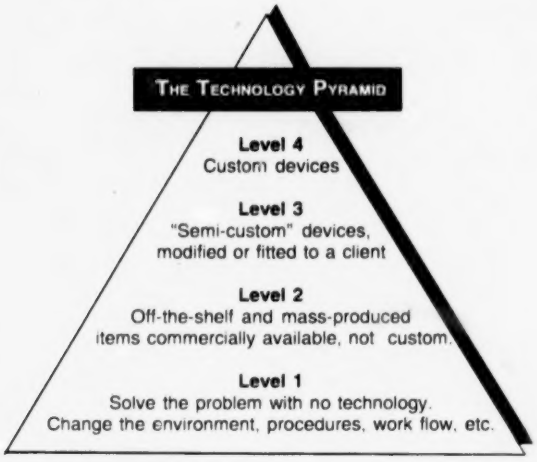
#### MAINTENANCE:

**Who is responsible for maintenance and service?** The more complicated the product, the more likely that service will become a problem. The first important maintenance item is **adequate, understandable, written information. You need to find out if the dealer will rent or lend a substitute if the device has to be sent back to the factory for service.**

## The Technology Pyramid and Professional Skills

Hedman[5] presents a "technology pyramid" with four levels to classify assistive technology broadly (see below). **Level 1 does not require technology;** simply

changing the environment, work flow, or similar factors often can solve the problem. **Level 2 includes "off the shelf" commercially available equipment that needs no adaptation. Level 3 includes commercially available items that require modification or skilled fitting. Level 4 includes unique items designed and built specifically for one client.** When equipment designed for level 4 is successful, and when the numbers of clients for whom it is appropriate justify the costs, the designs will become commercial and move to levels 3 or 2. When the cost of skilled professionals to design, fabricate, fit, and maintain unique items is considered, there is much greater cost for any item at level 4 as compared with similar items at levels 3 or 2. This economy of technology also roughly parallels the professional engineering skills needed at each level. However, the picture is quite different for nonengineering skills, or what may be characterized as clinical or "people" skills. **Skills in needs assessment, psychosocial aspects, functional implications of disabling conditions, and the like are needed to match assistive technology and human needs at all levels of the pyramid.** Whether deployed by an engineer or by a counselor, these "people" skills make the difference between useless "junk" and assistive technology that meets the personal needs of a specific client.


THE TECHNOLOGY PYRAMID
Level 4
Custom devices
Level 3
"Semi-custom" devices, modified or fitted to a client
Level 2
Off-the-shelf and mass-produced items commercially available, not custom.
Level 1
Solve the problem with no technology. Change the environment, procedures, work flow, etc.

*The Technology Pyramid*, adapted from Hedman[8]

As assistive technology has moved from research and development to large-scale service delivery, it has become clear that **it is not cost-effective or appropriate to focus all training on biomedical, electrical, and other engineers to meet the increasing needs for direct service providers. Highly trained engineers, who will act as inventors and consultants for difficult cases, should be available for items at levels 3 and 4. Those with some engineering training (or "engineering technologist" degrees) can be useful and cost-effective for complex devices that require extensive hand work.[9] However, persons without engineering degrees who have training in assistive technology can successfully deploy the services from levels 1–3 of the pyramid at far lower costs than can engineers.** With this recognized, terminology in the field has shifted from "rehabilitation engineering" to "assistive technology," and reflects the practical concerns of providing assistive technology to clients and professional participants beyond the original cadre of engineers.

## Assistive Technology and Rehabilitation Counseling

There are about **12 million adults with disabilities in the United States.**[10] The tremendous success of assistive technology in accomplishing rehabilitation goals has justified an explosive growth in assistive technology services and professionals. Recent legal changes in the United States, including the 1973 Reha-

bilitation Act, the 1986 Technology Act, and the recent Americans with Disabilities Act have fostered expansion of assistive technology services. As a result of the 1986 Rehabilitation Act Amendments, **federal regulations require that rehabilitation engineers be included in teams that provide federally-funded services to those with disabilities. The Technology Act Amendments of 1992 require state plans to describe how a range of rehabilitation technology will be provided at each stage of vocational rehabilitation, and how assistive technology devices, services, and work site assessments will be included in assessing eligibility and rehabilitation needs.**[11] This legislation and growth has meant that technologically skilled staff members are increasingly sought for positions in a variety of organizations, including rehabilitation hospitals and facilities, state vocational rehabilitation agencies, schools, business, industry, and in commercial enterprises that support rehabilitation. Staff members in these positions still need the traditional "people-oriented" counseling skills; now, technological skills are needed as well.

Several major factors will increase the need for rehabilitation services and assistive technology in the United States in the future. Medical advances ameliorate the effects of formerly fatal conditions so that they now cause disability rather than death; **increased survivorship means more persons with severely disabling conditions and a greater variety of disabling conditions in the population**. These advances also allow a greater proportion of the population to survive into old age, reinforcing the massive swell in the numbers and proportions of persons in the older segments of the population from aging "baby boomers." **Elderly persons use proportionally more rehabilitation services than younger persons; in the United States, they now control a greater proportion of wealth with which to pay for services.** Our economic structure supports innovation and improvements in technologies that increase productivity and profits; innovation in critical segments such as electronics also will be deployed in assistive technology to meet increasing economic demand. Recent legislation that broadens access to technology, including the ADA, also will strengthen demand. However, the cost will be great, so assistive technology that will result in vocational placement for younger persons with disabilities will be avidly sought in an effort to provide a more equitable cost-benefit ratio.

**More assistive technology and a wider range of conditions also means rehabilitation professionals must have greater knowledge and skills than in the past.** Knowing what a device does and how to deploy it is critical in selecting clients for whom it will be useful; therefore, professionals must collect, sift through, and manage a greater volume of information about more different types of assistive technology in order to find the particular information useful for a specific client. **Professionals are also responsible for training a wider variety of clients to use the increasing variety of technologies.**

As technology service providers are trained in disciplines other than engineering and research, the need for training in assistive technology for non-engineering rehabilitation professionals has increased dramatically. As noted by Enders and Hall,[7] "No one professional discipline can be identified as the sole or even primary source" of employment-related technology services (p. 222). These authors then list engineers, occupational therapists (OTs), physical therapists (PTs), rehabilitation counselors, nurses, and others who now provide assistive technology services. Mann and Lane[12] have identified 10 professions as "especially involved" in assistive technology, including the clinical disciplines of rehabilitation counseling, occupational therapy, physical therapy, and speech-language

pathology. Mann and Lane note that **rehabilitation counselors need a "broad picture" of the person to place them successfully in education or employment. If a person with a disability needs an assistive device to accomplish these ends, the rehabilitation counselor must understand its use and importance to facilitate access to the device.** Mann and Lane also describe rehabilitation technologists as persons "without formal training in engineering" but who "have extensive experience working with materials and devices."[12] and point out the value of such persons. Note that their definition does not differentiate the technologist from any clinician who may have similar technology-related experiences. Thus, according to Mann and Lane, **a rehabilitation counselor may also be a rehabilitation technologist if he or she is experienced in assistive technology**. It is our belief that this sort of valued counselor-technologist will be in high demand in the near future, especially when delivery of assistive technology becomes a common practice in rehabilitation.

The assistive technology training needs of rehabilitation counselors has been documented extensively. A full issue (12 articles) of *Rehabilitation Education*[13] was recently devoted to this topic. Chubon, Stewart, and McGrew[14] note the great potential for assistive technology, and the corresponding need for the rehabilitation counselor to be educated in assistive technology. They discuss assistive technology specific to vocational rehabilitation activities and point out, "Whether or not assistive technology will benefit persons with disabilities is largely dependent upon counselors and other evaluators becoming knowledgeable in its use...."[14] Moreover, they predict that the rehabilitation counselor will have to become somewhat of a technology specialist in order to meet client needs."[14] They also discuss the educational implications of deploying assistive technology, and call for curriculum changes to reflect assistive technology progress.

Langton, Coker, and Smith[15] conducted an important survey of rehabilitation technology use in state vocational rehabilitation agencies. **They affirmed that many state vocational rehabilitation agencies agencies are now incorporating rehabilitation technology in their service-delivery systems.** They also reported that rehabilitation engineers are indeed used as outside consultants, though not in significant numbers.[15] Nearly half (46.3%) of rehabilitation counselors are most frequently reported as designated personnel with primary responsibility for delivering assistive technology services. At the same time, these researchers reported that continuing education of vocational rehabilitation staff members at-large, and the training of selected vocational rehabilitation counselors in assistive technology, are identified by state vocational rehabilitation agencies as the most critical training needs. Peterson, MacArthur, and Brady[16] found **vocational rehabilitation clients are among the most frequent users of assistive technology as opposed to elderly or special education populations**. Also, as suggested by Chan, Matkin, McCollum, and Parker,[17] rehabilitation counselors must become more aware of innovations in assistive technology so as not to underestimate the potential of persons with disabilities for independent living and productive work.

Rehabilitation counselors are often deeply involved with assistive technology issues. Furthermore, there are more rehabilitation counselors than engineers that deal with people with disabilities who can benefit from assistive technology. **Counselors judge the effectiveness of assistive technology solutions, recommend assistive technology devices, and coordinate assistive technology and other services.** They often search out assistive technology resources, allocate resources to assistive technology, or present cases in an effort to have resources

devoted to assistive technology. They help clients solve problems, make decisions, become comfortable with and learn to use new technology. Finally, **experienced counselors can serve as technology resources for other professionals.** The "person orientation" is a critical strength in these roles, and the rehabilitation counselor is a key figure in successful assistive technology service delivery.

## Summary

**The "thing orientation" sometimes evident in assistive technology is often a barrier to the types of students and professionals who choose "person-centered" careers in rehabilitation counseling.** With the federal mandate requiring assistive technology to be incorporated in rehabilitation services, rehabilitation professionals (including rehabilitation counselors) have no choice but to involve themselves in assistive technology service delivery.

Rehabilitation counselors are encouraged to attend continuing education or training workshops in assistive technology. Conferences organized by the Rehabilitation Technology Association (RTA) and RESNA (formerly the Rehabilitation Engineering Society of North America) are valuable opportunities to gain state-of-the-art assistive technology information. Some universities provide certificate training programs in assistive technology for practicing rehabilitation counselors and Master's degree programs in rehabilitation counseling with a specialization in assistive technology for graduate students. It is critical for rehabilitation counselors to become familiar with assistive technology and be prepared to incorporate these services in their individual written rehabilitation plans.

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## QUESTIONS BASED ON THIS LESSON

5. *The application of technology to the lives of disabled persons without the implication of being exclusive to engineering or medical settings.*

   This definition applies to which of the following?

   A. Rehabilitation engineering

   B. Rehabilitation technology

   C. Applied disability rehabilitation

   D. Assistive technology

6. When making an informed choice about an assistive technology device, the authors believe that:

   A. It is sufficient to find out only the tasks it can accomplish; what it cannot do is irrelevant.

   B. If a prescription is not required, consulting with an unbiased professional is a waste of time.

   C. It is wise to request a description in plain language because complicated devices are prone to abandonment by the user.

   D. When considering the competition, keeping a healthy level of skepticism is unproductive because, as a result, a decision becomes virtually impossible to reach.

7. All of the following are areas of assistive technology listed by the authors in this lesson except:

   A. Workplace barriers

   B. Computer access

   C. Work station modification

   D. Seating

8. Which of the following statements about Hedman's 4-level "technology pyramid" is true?

   A. Level 1 requires that technology be used to solve the problem at hand.

   B. It is not cost-effective or appropriate to focus all training on biomedical, electrical, and other types of engineers in order to meet the increasing needs for direct service providers.

   C. Skills in needs assessment, psychosocial aspects, and functional implications of disabling conditions are needed to match assistive technology and human needs only at levels 2 and 3.

   D. Level 3 includes unique items designed and built specifically for one client.

# Rehabilitation Technology Review

LESSON 3

# Low-Cost Technology Options for ADA Compliance

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Professional Advancement Series

Presented by *Directions in Rehabilitation Counseling*

## KEY POINTS

- The Americans with Disabilities Act, which was signed into law on July 26, 1990, extended employment provisions of the Rehabilitation Act of 1973 to all businesses with 25 or more employees as of July 26, 1992, and to all businesses with 15 or more employees as of July 26, 1994.

- One of the most common misconceptions among both counselors and building owners about the ADA is that building adaptations for persons with disabilities are expensive.

- Many accessibility applications can be implemented by any employer's maintenance department with minimal guidance. As the author emphasizes, the greatest expense is being willing to use creativity and ingenuity in generating cost-effective solutions.

- In this lesson, specific instructions are offered to guide maintenance workers—and even nontechnical persons—in cost-effectively complying with ADA regulations in the following areas: toilets and grab bars, water coolers, door closers and openers, light switches, ramps, door width, carpet padding, carpet replacement, wheelchair lifts (hydraulic and mechanical), and door modifications.

## Introduction

The Americans with Disabilities Act (ADA) was signed into law by President Bush on July 26, 1990, in front of more than 1000 persons—one of the largest audiences ever for a presidential signing. The ADA effectively extends equal protection of the 1964 and 1991 Civil Rights Acts to persons with disabilities, who, according to Congress, account for 43 million Americans. **ADA extended employment provisions of the Rehabilitation Act of 1973 to all businesses with 25 or more employees as of July 26, 1992, and to all businesses with 15 or more employees as of July 26, 1994.**

The facilities accessibility provisions of the ADA are more stringent than those in the Rehabilitation Act, and **buildings previously in compliance may not have been so after January 26, 1992. There are also "teeth" in ADA that were not in the Rehabilitation Act**: fines can run as high as $50,000 for the first building accessibility violation, $100,000 for the second, and whatever the Attorney General thinks is warranted to attract the employer's attention after that—including being shut down—to ensure that compliance is achieved. Some employers and building owners have panicked. Others have done nothing. **Believe it or not, there is a reasonable middle ground.**

**One of the most common misconceptions among both counselors and building owners about the ADA is that building adaptations for persons with disabilities are expensive.** Many consultants and companies have sprung up overnight with high-priced, generally useless solutions to ADA accessibility. Although it is true that certain solutions will be expensive, it is also true than **many accessibility applications can be implemented by any employer's maintenance department with minimal guidance.** Some of these applications can even be done using scrap or low-cost materials. For employers without maintenance departments, local businesses such as muffler shops, sheet metal fabricators, welding shops, and so forth can provide the needed assistance. **The greatest expense is being willing to use some creativity and ingenuity in generating cost-effective solutions.**

The purpose of this lesson is to help professional rehabilitation counselors identify effective and low-cost strategies to help employers with ADA implementation and compliance. **Specific instructions are included for the maintenance department; in some instances, the procedures outlined in these instructions can even be done by a nontechnical person.**

## Toilets and Grab Bars

One of the favorite areas of the "overnight consultants" is wheelchair-accessible bathrooms, raised toilet seats, and grab bars. If you or your employer-client calls on one of these specialty consultants, they will generally quote a price between $300 and $400 per toilet. However, **any employer's maintenance department can make the accommodation for approximately $15 per toilet.** Here is the practical solution, along with directions to give to maintenance workers:

1. **Measure the square feet of toilet area for the wheelchair-accessible stall. It should be a minimum of 5 feet by 5 feet, and you may have to remove a stall divider to accomplish this.**
2. **Decide how the grab bar should be anchored to the wall (i.e., support wall, non-support wall, or metal divider). Locate the wall studs and measure exactly where the grab bar should be located. The range should be 33–36 inches off the floor, minimum to maximum height. The minimum length of the grab bar should be 54 inches.**
3. **Take a piece of scrap metal pipe (diameter, 1¼–1½ inches) and either bend or cut and weld it to specifications. The points of support for the grab bars *must* line up with wall studs. If this is impossible, weld up a support leg to transfer the weight to the floor. Keep in mind that the bar must be able to support a *minimum* of 250 pounds.**
4. **A second bar of 18 inches minimum is needed at the same height behind the toilet. (There are some exceptions to this rule, but you need an engineer in the premises to help you with them.)**

5. **Instead of raising or replacing the toilet seat, raise the entire toilet. The height of the toilet seat should be 17–19 inches above the floor. Most toilets should be raised 3½–4½ inches to meet the minimum height requirements. To accomplish this, build a raised platform approximately 2 inches wider and 2 inches longer than the base of the toilet. It should have a 4½-inch hole in the center. This can be done out of scrap lumber. Pieces of wood 2 feet by 10 feet or 2 feet by 12 feet work particularly well. Treated lumber for longevity and resistance to rot and mildew is recommended. Paint and seal the platform to desired color scheme.**
6. **Pick up a piece of scrap pipe 4–6 inches long, the same diameter as your sewage drop. You will also need two new wax seals (rings, toilet doughnuts) and possibly a pipe coupler.**
7. **Turn the water off and drain the toilet. Unbolt the toilet from the floor and/or wall, setting it out of the way.**
8. **Remove used wax seal from base of toilet and toilet stub pipe. Place wooden platform with center hole directly over sewer drop and check for alignment with toilet. Remove platform.**
9. **Place scrap piece of pipe through hole in center of platform, pressing into existing sewage drop. This is where you may need the pipe coupler. Trim the pipe flush with the top of the platform. If everything seems to fit, you're ready to put it back together. If it doesn't fit, trim to fit.**
10. **Invert first wax seal over the previously existing floor mount. Press down firmly to get a positive seal. Remount platform and top wax seal. Bolt platform to the floor, using lagbolts at least 2 inches longer than the height of the platforms, securing platform to floor. Set toilet firmly down on seal and bolt to the platform, using 3-inch lagbolts.**

**TIME AND EFFORT:** 2 hours (not counting paint drying time) per toilet

**COST:** $15 per toilet

**SAVINGS:** $385 per toilet

**If the employer does not have a maintenance department, the most expensive person to call to retrofit the toilet would be a plumber. Probably adequate and much cheaper is a good all-around handyman.**

If the employer does not have someone who can bend or weld up the pipe for the grab bars, your best bet would be a **muffler shop**. Give them the measurements and they will take care of it for you. The muffler shop will probably want to supply the pipe, because that is how their machines are set up. However, it will be considerably less expensive than hiring a specialty consulting firm to do it for you.

**TIME AND EFFORT:** Your main expenditure of time is locating appropriate people to help you, and this depends strictly upon your location.

**COST:** Plumber: $50–$75 per toilet
Handyman: $25–$30 per toilet
Muffler shop: $10–$20 per toilet

**SAVINGS:** $275 per toilet

## Water Coolers

Another favorite area of expenditure for the overnight consultant is water coolers. **Beware of anyone who says that water coolers must be replaced without looking at the cooler to survey the dimensions.** The consultant may well be on commission for a water cooler company. **The cost of an "accessible" water cooler runs $550–$750!** Instead, use a practical solution. Anyone who can handle a screwdriver can do this one:

1. **Measure the height of the water flow out of the spout. You need a minimum of 4 inches and it should jet at an angle of approximately 45°–80.° If the water does not flow this high, most water fountains have a flow control adjustment located under the button. Adjustments can be made with a screwdriver.**
2. **Once the water height is accomplished, the technical part begins. Mount the Dixie Cup dispenser on the wall. Some even come with peel and stick adapters.**

3. **Check with a local industrial paper products supply house. Many of them will give you the dispenser if** you buy a quantity of Dixie Cups. I recommend cones rather than cups because people will be more inclined to dispose of them properly.

**TIME AND EFFORT:** 15 minutes.

**COST:** $3.95 per hundred for disposable cups at the supermarket; the dispenser is included free. The cost can be reduced if the employer buys in bulk from an industrial paper supply distributor.

**SAVINGS:** $546–$746 per water cooler.

If, for some reason, no person at the facility can operate a screwdriver, call a handyman. It will probably cost $20–$25 for a service call.

## Door Closers and Openers

**One of the most common but difficult renovations required by the ADA is the replacement of round door knobs with levers. It is difficult because the levers simply are not available in sufficient supply—and when they are available, they can be very expensive.** The plain levers cost at least $20 per door and may be a great deal more expensive than that, depending upon the merchant. The locking levers are approximately $75 per door (again, assuming availability). The City of New York alone contracted for the first 6,000,000 pairs of door levers from a particular American plant, and the plant had to assimilate three European plants to increase production to that level.

There are easier, less expensive, more readily available solutions. **Use door magnets and strap openers/closers. This allows the employer to retain the old round door knobs, which are transformed into openers/closers that meet ADA requirements.** Here are instructions for renovation:

1. **Disable the door catch mechanism. The best way to do this is to remove it altogether. Cosmetically, you can replace the metal plate with the hole in it with one that doesn't have a hole in it, but this is purely personal preference.**
2. **Install a magnetic cabinet-style catch that requires no more than five pounds resistance to free. These are readily available at any cabinetry shop or hardware store. This will allow the door to stay shut but make it easy to open for a person with a hand impairment.**
3. **Add a plastic or leather strap to the former door knob (which is now a door opener or closer). The strap should be looped and large enough that a hand can be put into the loop to use it to pull the door open or closed. There should be loops on both sides of the door.**
4. **If the door requires a lock, add a deadbolt lock to it. If the employer has someone with a hand impairment who needs to be able to lock and unlock the door, key adaptations are readily available through any lock shop and are reasonably priced.**
5. **If the employer does not have a maintenance department, any person handy with a drill and screwdriver can perform this adaptation. The hard part is getting the door knob off in the first place, but perseverance usually prevails.**

**TIME AND EFFORT:** 30 minutes to remove catch mechanism, magnetic catch, and closing/opening straps.

**COST:** Per door: $0.50–$1 for magnetic catch; $2–$5 for straps (depending upon how fancy); $7–$20 for deadbolt lock (if needed); $0 (if keys are made at the lock shop)–$1.50 for add-on key adaptations. Total maximum cost: $27.50.

**SAVINGS:** $47.50–$75 per door.

**LESS EXPENSIVE ALTERNATIVE: If the usual position of the door is open, prop or block it in that position during business hours and this will eliminate the need for the door modification.** However, if the door is to the office of an employee with a hand-mobility limitation, the employer should make the alterations anyway. The worker needs the freedom to come and go from the office at will without other assistance.

## Light Switches

**Light switches are not generally a problem in newer construction, but in older buildings they will be too high to comply with the ADA. The old standard was 54 inches off the ground, which, according to the ADA, is too high.** To replace or lower would require knocking new holes in walls and repairing the old ones. This would be tremendously expensive to the employer in terms of maintenance department time and involvement, not even counting the possibility of fouling up the electrical system and electrocuting workers. There is a simpler, less expensive way:

1. **Obtain a Venetian blind control rod, minimum of 12 inches in length, from any Venetian blind store. You will need one for every light switch to be modified.**
2. **Using a one-fourth-of-an-inch drill and a one-sixteenth-of-an-inch drill bit, bore a horizontal hole through the light switch, one fouth of an inch back away from the tip. (Keep fingers and thumbs out of the way!)**
3. **Attach the Venetian blind control rod to the hole, allowing the switch to be turned on and off from 12 inches lower.**
4. **If the employer lacks a maintenance department, any person handy with a drill could do this adaptation.**

**TIME AND EFFORT:** 20 minutes for the first modification to figure out the logistics and 5 minutes thereafter.

**COST:** Venetian blind rods range from $0.50–$2, depending upon material; the employer can probably negotiate a discount for buying in volume; additional cost for labor depends upon what is being paid to the tradesworkers.

**SAVINGS:** Depends upon wage scale. One hour will be required for the electrician, 2 hours are required for wall repair and painters; $10–$15 for materials.

## Ramps

We recently reviewed accessibility at a shopping center where three merchants had spent $300 for an asphalt ramp that, in fact, did not pass inspection because it was too steep, too narrow at the top, had too much of a drop-off on the sides, and lacked an inch to allow for a smooth transfer between ramp and sidewalk. Needless to say, it was recommended that the merchants contact the asphalt company and demand that the job be redone. Consider these less expensive ways:

1. **Before hiring anyone, be sure that you or your employer-client know dimensions and responsibilities for surface texture. Be very specific in asking for bids to do the work. For every inch of height, the ramp has to be a minimum of 1 foot long. The ramps also must be a minimum of 36 inches wide at the most narrow point. If the sides are not ramped and are over 6 inches tall, there must be handrails 29–32 inches high. There are no exceptions to these three rules.**
2. **Look around your employer-client's area to see if any construction is under way nearby. If there is, find out who is doing the concrete work. You may be able to negotiate for a small amount of concrete, costing significantly less than hiring the concrete company to make a stop for one small job. Left-over concrete at the end of the day is construction waste and has to be disposed of somewhere; it might as well be disposed of in front of your employer-client's place of business and turned into a ramp.**

   **It is imperative to ask the concrete workers to complete the job with a broom-sweep finish to make the ramp slip-resistant.**

A second factor to consider is that **most concrete companies will not deliver less than 2 yards of concrete**, and what is typically needed is ½–1 yard of concrete per ramp. **If you do not need several ramps, call your Chamber of Commerce or Merchant's Association and see if you can get enough people together to buy a whole truck of concrete.** In doing so, do not hesitate to mention that the amortized cost per merchant can be as much as $50 per merchant.

3. **If you cannot find a concrete company already working in your employer-client's area, hire a**

**concrete company and ask if they would consider selling you the construction leftovers or doing your job in conjunction with another small job.**

4. **If all else fails, hire your own concrete company instead of an asphalt company. An asphalt ramp will tend to settle and will go out of compliance as it shrinks. A concrete ramp is a permanent commitment to ADA compliance.**
5. **Consider alternative materials, such as leftover brick, scrap steel, or even pressure-treated lumber. Any of these materials could be used to build a ramp that will comply with the ADA, as long as you treat the surface texture appropriately.**
6. **Surface texture must be nonskid and nonslip, even when wet. This can be achieved on a wooden ramp by simply mixing 2 cups of sand per gallon of final paint or sealant coating. This also serves to make it more slip-resistant in winter.**

**Slip-resistant rubber surfacing tapes can be used to achieve the resistance**. These can be obtained from any safety supply house and can be used on wood, metal, or concrete. **Special slip-resistant paints and sealants are available on the market, but these are expensive**.

**TIME AND EFFORT:** The more time you put into it, the less it will cost your employer-client. If they have more money than time, simply call a concrete company and complete the task.

**COST:** Varies, depending upon examples above and the time you are willing to put into it.

**SAVINGS:** at least $250.

## Door Width

**The minimum door clearance allowed by the ADA is 32 inches. But keep in mind that a 32-inch door is not 32 inches wide; it is typically 29 inches wide, due to door stops and hinge placement.** In most instances, this is an easy problem to fix, and the employer's maintenance department can usually take care of it quickly.

1. **Obtain bifold (reverse-turn) hinges at any large hardware or building supply house.**
2. **Remove door from mounting and remove old hinges.**
3. **Replace standard hinges with bifold hinges and remount door.**

This will increase door width to about 31 inches. If it is a metal frame door, this is all you can do without replacing the entire door frame. When the employer renovates again, he or she will need to install a door frame allowing for a full 32 inches of clearance.

If it is a wooden door frame, proceed to next step.

4. **To widen the additional inch, remove the door stop strips from 42 inches above the floor down.**

This should provide nearly 32 inches of clearance so that the employer can feel fairly safe until the next renovation.

**TIME AND EFFORT:** 30–45 minutes per door

**COST:** Bifold hinges cost approximately $8–$12 per door. Some doors require two hinges; others require three.

**SAVINGS:** Replacing a door and casement would cost $200 plus approximately 4 hours of carpenter labor if it is a nonsupport wall and 8 hours of carpenter labor if it is a support wall. Savings will be at least $400 per door up, depending upon local labor costs.

## Carpet Padding

**Removing existing carpet pads is a major task that can completely disrupt business and cost thousands of dollars**. Some carpet pad is bonded directly to the carpet, which means that the employer must replace the carpet as well, resulting in additional expenditures. **A quick, inexpensive, readily-available solution exists**, and you probably will not even need the maintenance department.

1. **Survey the building and define the minimum acceptable accessible pathway.**

If you need help in establishing the accessible pathway, we publish a *Facilities Accessibility Checklist*, which makes it easy for you. (See additional resources list at the end of this lesson.)

2. **Call any large flooring or large building materials supply house and ask for stair runner in hard plastic. This is the same material as that of office roller-chair protection pads. It comes in varying widths and colors, and can be bought to specification.**

**CAUTION**: The transition between surfaces must be smooth and even.

3. **Select the size and color that best suits the accessible path of travel. Remember that you must have a minimum width of 36 inches to meet regulatory requirements.**
4. **Purchase and install by simply unrolling the stair runner. It has small plastic gripper spikes on the back to keep it securely in place on top of carpet, and requires no further effort on your part.**
5. **For the wheelchair-accessible work area, the entire area should be covered with a roller-chair pad or something similar to provide the necessary hard surface. For very large areas or areas with odd measurements, hard surface pads may be obtained from industrial safety supply houses at considerably less cost.**

**TIME AND EFFORT:** 1 hour to survey the building, take measurements, locate supplier, and order material.

**COST:** Optional: $20 for *Facilities Accessibility Checklist* (guide for completion plus 10 checklists); $0.88– $2 per foot for 36-inch–wide stair runner. The cost of office roller-chair pads begins at $10, depending upon the size of the area.

**SAVINGS:** $5 per square yard to remove pad, plus lost work time while the carpet is being removed and replaced; "the sky is the limit" if the entire carpet has to be replaced due to the pad being bonded to the carpet.

## Carpet Replacement

If, despite your best efforts, your employer-client is unfortunate enough that he or she must replace the carpet anyway, take heart. Some savings are still possible. Perhaps they're building a new building, or maybe their carpet needs replacing anyway, or the office manager is tired of the color and wants to redecorate. Such possibilities should be considered for maximum savings. **ADA modifications are not usually much more expensive than other renovations if the employer is redecorating.** Here are some items to consider:

1. **Carpet pad is not totally forbidden, but it must meet specifications. There are special carpet pads designed for low compression that may not necessarily be advertised as "ADA approved." If you can find ones in the correct specifications that are not advertised as "ADA carpet pads," they will usually be cheaper.**
2. **To judge specifications, look for compression of no more than ⅛ of an inch, taking into account that the carpet will have some give. Total compression of both carpet and pad cannot be more than ½ of an inch. Use of a low compression pad will add to the life of the carpet, not to mention the life of knees and ankles of those who must walk on it instead of roll on it.**
3. **Techniques to measure the carpet are as simple as using two rulers. Lay one ruler flat on the floor to function as a straight edge. Stand the other ruler on its end directly in front of the straight edge with the 1-inch marker down where you can see the numbers. Press down as hard as you can on the vertical ruler and take reading at the straightedge. Remember that wheelchairs with narrow wheels and sometimes heavy people in them may exert as much as 100 footpounds of force. Be firm when you press down to obtain an accurate measurement of total compression of both carpet and pad. The reading of both carpet and pad should be no more than ½ of an inch combined.**
4. **There are machines designed to measure carpet and pad compression. Many carpet dealers will have one. If they don't, the above technique will give you the information you need before advising your employer-client about purchasing the carpet.**
5. **Follow this procedure and have these questions answered in the store *before* purchase and installation! *Do not* trust salespersons to do it for you or**

**take their word for it. They may be honest, but they also may be out to make sales at your employer-client's expense and your professional reputation.**

**TIME AND EFFORT:** 5 minutes to take the compression measurement. The majority of time and effort will be in locating the color and kind of carpet you want.

**COST:** Two good strong rulers, costing approximately $1 each. They may already have them in the office—ask the office manager before buying more.

**SAVINGS:** Literally thousands of dollars, compared with buying the wrong carpet and pad, not to mention the high level of frustration associated with such a mistake.

## Wheelchair Lifts

**Installation and renovation of wheelchair lifts has created a whole new cash-cow economy in the building and design of accessible equipment**. Companies are springing up overnight to capitalize on this industrial boom, and you need to be very careful in advising employer-clients about purchases. **Many lift companies attempt to sell a wide variety of extras when, in fact, all the employer needs is a means to get someone in a wheelchair up and down safely**.

**Lifts may be required on vehicles or on buildings that do not have sufficient room to install a proper wheelchair ramp**. The mechanics of the lifts are essentially the same, whether put on a vehicle or a building. **The distance lifted will change the price proportionately as to how high the platform has to be lifted**. A second consideration is that **if the lift is located outside of a building, it should be covered from the elements to protect people from poor weather**. To lift the platform 5 feet will take about 2 or 3 minutes, and the person could be drenched from rain in that period of time.

**You must also be certain that *location* of the lift is in full compliance with ADA. Many employers erroneously think that they can use their shipping and receiving department lift at the back of the storage warehouse**. This assumption is incorrect, and will likely cause trouble. The lift must be placed at the main entrance for whatever service the disabled person needs to access: the personnel office, the sales office, the front door, etc. It should be **clearly marked** and **directional signs** to it posted, if necessary. The same surface textures as for ramps apply, and the same control requirements as elevators. Minimum dimensions are 30 inches by 48 inches.

The cost of wheelchair lifts exceeds our $100 limit for this lesson, but is low-tech in that **the employer's needs are for basic services, not gizmos and gadgets**. Prices range from a low of $400–$500 to a high of $3000–$4000. There are **four common designs of wheelchair lifts**, and knowledge of the differences can save your employer-clients tremendous sums of money. Beyond the four different design capabilities, **the main cost is the manufacturer's name**. The four design types fall into two distinctly different operational types: **hydraulic and mechanical**.

### HYDRAULIC WHEELCHAIR LIFTS:

The two forms of hydraulic lifts are ***full power*** and ***power up with gravity feed down***. The difference in cost of these two is that **full power will cost approximately one third to one half more**. Given that we all live on Earth and everyone has access to gravity, I find it better to use Newton's Third Law of Motion that "what goes up must come down." Besides, gravity is cheap—**power down is a luxury feature that significantly raises both the initial cost of the lift and lifetime maintenance without accomplishing anything significant**. If your choice is hydraulic, choose **power up with gravity feed down** for the most cost-effective unit.

### MECHANICAL WHEELCHAIR LIFTS:

The two forms of mechanical are **cable lift** and **gear drive**. **Cable lift** is exactly what it says—**a set of block and tackle with steel cable is used to raise and lower the platform**. The motor design for this lift is much like a small electrical wrench, and the number of moving parts is phenomenal.

By contrast, **the gear-driven mechanical lift uses a worm gear-driven jack arm, which acts as the lift mechanism**. This, too, contains a **large number of moving parts** other than the lift platform and controls, but has **slightly less potential for problems than the cable lift**.

**Both mechanical lifts require continuous servicing with extensive periodic maintenance. Proper service and maintenance is absolutely mandatory**. The last thing that a prudent employer would want in his or her establishment is to skimp on maintenance and cause the wheelchair lift to stop half-way to the ground. This also makes for bad public relations.

The rank of cost vs. efficiency is as follows:

1. **The cheapest initially but least efficient is the cable lift. This design is the most likely to break down and has the largest number of moving parts that require servicing. A cable lift will cost approximately $400–$500 plus installation. Ten-year maintenance will cost approximately $3500–$4000, and the employer can expect a 10-year lifespan with proper maintenance.**

**AMORTIZED COST PER YEAR (10-YEAR ESTIMATE)** $390–$450.

2. The mechanical gear-driven lift is the next least efficient and is average in terms of cost. It, too, has many moving parts that will require servicing. The initial cost is approximately $1000–$1500 plus installation, with 10-year maintenance of approximately $2125. The longer it is kept, the more expensive it will be to maintain. In the latter part of the 10 years, finding replacement parts and general repair may become problematic.

**AMORTIZED COST PER YEAR (10 YEARS EXPECTED):** $310–$362.50, with no guarantees that employers will be able to repair it 5 years later.

3. **Full power is next in line. Initial cost will be approximately $3000–$4000, with 10 year maintenance cost approximately $500–$1000. The lifespan will be approximately 10 years.**

**AMORTIZED COST PER YEAR (10 YEARS EXPECTED):** $350–$500.

4. Power up/gravity down is the most cost-effective, amortized over the life of the lift, and this is the application we recommend for most industrial clients. It has the fewest number of moving parts and requires the least maintenance and upkeep. It is the most reliable of the four designs. Initial cost is $2000–$2500, with 10-year maintenance costing approximately $500–$1000. Expected lifespan with proper maintenance would be 15–20 years.

**AMORTIZED COST PER YEAR (10 YEARS EXPECTED):** $250–$350. In reality, if maintained properly, this unit should provide more years of service than 10, further reducing the amortized cost.

If your employer-client chooses this option, **you may want to contact an automotive supply house to investigate availability of a used or rebuilt automotive lift**. The cost varies greatly, depending upon the circumstances. The more investigation you do, the more your employer-client will save.

A second alternative would be to **contact a lift truck company for a lift mask** (the lifting portion) **from a fork lift**. The price range is similar to the automotive lift—from very little to nearly the cost of a new lift. **The primary advantage besides cost is that the employer can make a larger lift platform**. This would accommodate lifting more than one person in a wheelchair, a cart, and/or shipping items.

When choosing a wheelchair lift, **look for companies that have been in existence for at least as long as the employer plans to keep the lift. If they have to hire a machine shop to do repairs and tool parts after the company has ceased operations, it will be much more expensive than the figures quoted above**.

Maintenance on lifts can be a challenge and much more expensive if the manufacturer has ceased operations or has made replacement parts into specialty parts that can be purchased only from them. **Look for lifts that use common parts that are readily available from other sources than the lift company**. This is particularly

important if your employer-client is purchasing a lift for a vehicle, because it may break down far away from the establishment.

A few examples to consider: nonstandard hydraulic hoses for the hydraulic lift (such as an extra-fine left-handed–threaded metric coupler) would be very difficult to replace. Therefore, it is better to use a standard-course right-handed–threaded coupler that can be purchased at any automotive supply house or car dealership.

**Replacement electrical switches should be readily available at any electrical supply, automotive supply, or truck/tractor dealership**. Even bolts and screws may have to be ordered specially if they are not standard. **Be sure to inquire about all replacement parts before committing to a lift**.

**Another maintenance consideration is whether simple repairs to the lift can be done by the vehicle driver or the employer's maintenance department**. If not, will they have to take it back to the dealer or are there alternative locations? Figure into your calculations inconvenience and down-time for employees.

Before buying anything, **obtain a statement of warranty and liability from the manufacturer**. Do they guarantee that the lift will not dump someone out? What happens if it does? **These are legal liability questions you need to have answered *before* money is exchanged**.

**TIME AND EFFORT**: The more you invest, the more dollars your employer-client will save.

**COST:** Depends on what style you choose. We recommend power up/gravity down if the employer is buying a new one, but strongly recommend that you investigate recycling automotive lifts or lift trucks before buying a new one.

**SAVINGS: A wheelchair lift is a "pay me now, or pay me later" proposition**. Your employer-client can buy something inexpensive now and pay down the road, or they can buy something reasonable now and save down the road. The savings will depend upon how much time and effort you invest in research.

## ALTERNATIVES TO WHEELCHAIR LIFTS:

Some buildings are built into the sides of hills or mountains. Installing wheelchair lifts would be terribly expensive. **However, designing a long, winding sidewalk or ramp into the building would be an acceptable alternative**. An example would be to **place the wheelchair-accessible space around one side of the building and roll down the hill to the front door instead of in front of the building, requiring a wheelchair lift to get into the front door**. An engineer, architect, or surveyor familiar with the ADA would be required to help with design and layout of the parking lot and sidewalk or ramp. **Be sure to ask consultants if they receive commissions from any supply company, such as wheelchair lifts. Do business only with independents**.

The consultant should write a design that can be implemented by the employer's maintenance department or contract the work out. The usual rules on ramps apply to this situation.

In some circumstances, you should calculate the cost both ways. If there is a height variance from the parking lot to the front door of more than 10 feet, the ramp would have to be a minimum of 120 feet. In this case, investigate using side parking spaces or a lift. It might be more cost effective.

**TIME AND EFFORT:** The majority of time spent here is for finding a competent ADA technical consultant and obtaining quotes on the work. **Do not give the job to a consultant without taking other bids**. All ADA consultants are not created equal. **Getting more than one bid and negotiating will more than pay for itself in the long run**. The technical design could be done by mail if professional photographs are taken from all angles between the accessible parking place and the proposed entry way for the consultant's review. The technical consultant may also want to see a blueprint of the main access floor of the building.

**COST:** Depends on the layout. Hourly fees for technical professionals range from $50–$150 per hour. It should take no more than 4 hours per sidewalk or ramp to design

and write an implementation plan for the maintenance department. Allow another 2 hours if the technical professional is expected to contract the job or if the technical professional is working via the mail and cannot make a site inspection. Materials cost will be similar to those cited in the section on ramps.

**SAVINGS:** Compared with installing a wheelchair lift, hundreds or thousands of dollars. Savings depend upon layout of the parking lot and building as well as life of the lift.

## Door Modifications

**Some buildings, such as bank branches built between 1950 and 1970, have front double doors that total 5 feet in width. The problem in complying with the ADA is that neither side is wide enough to meet the 36-inch minimum standard, and widening the frame to replace both doors is prohibitively expensive.**

There is an easy solution: **install one door and use decorative panels to take up the remaining space**. The employer could use evenly spaced panels on both sides. The locking support frame in the middle of the existing door is not typically a weight-bearing structure, and can be easily relocated anywhere on the door frame.

There are a variety of choices with the decorative panels: complaint box, teller machine, mail drop, night deposit slot, bulletin board, list of building tenants, display case, or just something that is pleasing to the eye. The size and content is completely at the employer's discretion, so long as the main door is a minimum of 36 inches in width. Because they are fixing the door anyway, we recommend a 40-inch door for good measure. **The additional cost is minor, it looks better, and shows extreme good faith in compliance. Appearances, as in everything else, do count with the ADA.**

If the maintenance crew does not work on doors, **contract with a regular carpenter for wooden doors and a glass company for glass doors**. If you can find a carpenter who also works with glass and you are using combination wood and glass doors, it would be less expensive than a glass company. Ask for references and check them, just as you would for any other work. **Obtain several bids**, and be sure that your bidders are knowledgeable about local building codes.

**TIME AND EFFORT**: Once the materials are located and workers are selected, allow approximately 3 or 4 hours per door. Obtaining several bids will give you the best results if you are using outside labor. In comparison, it would take approximately 8 hours to install a new door frame.

**COST:** The main cost is the materials the employer chooses to match the particular architecture and to comply with the building code for their area. For example, plate glass is cheaper than tempered glass, which is cheaper than bullet-proof plexiglass. Steel doors are more expensive than wooden doors, and custom-made wooden doors are more expensive than plain doors. The employers taste and building codes will dictate basic cost.

**SAVINGS:** Savings depend on whether you can use the existing door frame and superstructure without having to tear them out or perform major reconstruction of walls.

## Conclusion

The examples listed are by no means the only creative solutions to the dilemmas posed by the ADA. However, they represent some of the major problems faced by the corporate clients of Rehabilitation Consultants Inc. and we hope you have found them helpful. These are not intended for specific application to every situation, but should prove effective for most facilities.

## ADDITIONAL RESOURCES

Accessibility guidelines for buildings and facilities. *Federal Register*. 1991;56(144).

*ADA Subscription Hotline*. Creative solutions by telephone to specific ADA problems. Call 205-967-9798 for more information, or write the author at Rehabilitation Consultants Inc, PO Box 43254, Birmingham AL 35243, for sign-up information.

Oakes BL. *Facilities Accessibility Checklist*. Birmingham, Ala: Rehabilitation Consultants Inc, 1992.

Oakes, BL. *Highlights of ADA Title III*. Birmingham, Alabama: Rehabilitation Consultants Inc, 1992.

## QUESTIONS BASED ON THIS LESSON

9. According to the author, which of the following statements is true?

   A. The ADA extended employment provisions of the Rehabilitation Act of 1973 to all businesses with 15 or more people as of July 26, 1992, and to all businesses with 10 or more employees as of July 26, 1994.

   B. The misconception that ADA-required modifications are expensive is common among building owners, but not rehabilitation counselors.

   C. A wheelchair-accessible stall should be a minimum of 5 feet by 5 feet.

   D. In retrofitting a bathroom stall to make it comply with ADA regulations, it is not essential that the grab bars line up with wall studs.

10. Which of the following type of ADA-required adaptation discussed by the author requires a Venetian blind control rod?

    A. Light switches

    B. Door openers

    C. Door closers

    D. Water coolers

11. With regard to reconstructing a wheelchair ramp for accessiblity purposes:

    A. For every inch of height, the ramp has to be a minimum of 5 feet long.

    B. The ramps must be a minimum of 72 inches at the most narrow point.

    C. If the sides are not ramped and are over 6 inches tall, the handrails must be 48 inches high.

    D. It is imperative to ask concrete workers to use a broom-sweep finish to make the ramp slip-resistant.

12. Which of the following statements about door width or door modifications is false?

    A. A 32-inch door is not actually 32 inches wide; it is typically only 29 inches wide due to door stops and hinge placement.

    B. When replacing doors for ADA compliance, standard hinges are much preferred over bifold hinges.

    C. The minimum door clearance allowed by the ADA is 32 inches.

    D. The author expects that employer-clients will realize a savings of at least $400 per door (depending on labor costs) if the steps for door replacement outlined in this lesson are followed.

# Rehabilitation Technology Review

LESSON 4

# Maximizing Use of Assistive Technology

**Aimee J. Luebben, MS, OTR/L**

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Professional Advancement Series

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## KEY POINTS

- The assistive technology service-delivery process is composed of three stages: (1) The determination of the client-device match; (2) the process of seeking and obtaining funding; and (3) the use of equipment.

- Underuse or nonuse of assistive technology may result from miscommunication during the client-device matching process, training problems, or client death. In the author's opinion, outgrowing a device and dying are perhaps the only legitimate reasons for misuse of assistive technology.

- Rehabilitation professionals can ensure current and future use of assistive technology devices through appropriate client matching (involving the client, using a model based on function as opposed to a diagnosis, and being knowledgeable on various client and device considerations) and long-term follow-up.

- When determining a client-device match, it is imperative to consider the needs, expectations, and wishes of the client while assessing functional status. Always keep in mind that a recommendation of no device at all may be appropriate for clients who exhibit an aversion to technology.

- In assessing functional status, it is helpful to view human performance holistically. One model assesses performance in three dimensions: area, components, and contexts.

- A major complicating factor in determining the best assistive technology involves the prospect of adding a device in the near future to the client's "equipment wardrobe." Then, the question arises as to whether the client should use an integrated controller, which provides access to all devices, as opposed to using one controller for each device.

- Integrated controllers are appropriate if: the best method for controlling each assistive device is the same; the client has a single, reliable access site; the performance on one or more device is improved; or the client prefers the single access method.

- Integrated controllers may not be appropriate if: the performance on one or more devices is degraded; greater cognitive demands make use difficult; access to other devices is desired from another position; the additional cost is not justified.

## Background Information

As a rehabilitation professional, I have spent countless hours matching people who need assistive technology devices with the appropriate equipment. **The time involved does not end with the determination of a match between client and device.** At that point, the process of funding the device begins; numerous hours are spent **talking on the telephone to potential funding sources, writing justification letters, appealing funding denials, and sometimes videotaping clients with the requested equipment**. Once obtained, **equipment training and use** is yet another time-consuming consideration for rehabilitation professionals.

**The assistive technology service-delivery process can be divided into three stages: (1) The determination of the client-device match; (2) the process of seeking and obtaining funding; and (3) the use of equipment. Each stage is equally important in accomplishing the final goal—teaching the disabled client to use the assistive technology device to the fullest potential.**

If a breakdown occurs during either of the first two stages, the person may not receive the device. Also, rehabilitation professionals should be aware that the stages that involve determining the client-device match and completing the funding process can proceed smoothly, only to have a problem happen when the client begins to use the equipment. Decisions made during earlier stages affect later stages, and may determine the extent to which the equipment is used.

Sometimes, the assistive technology device that has been determined to be required by the rehabilitation professional may be unused or underused by the person who receives the equipment. **Such misuse may occur because of miscommunication that resulted in an inappropriate client-device match, training problems, or client death.** Working primarily in community settings, I have been horrified to find the hoarding of never-used or no-longer-used adaptive devices in homes and community agencies.

Once while I was shopping, I saw a mother pushing her child in a power wheelchair. When I inquired as to why the child was not using the joystick to control the wheelchair, the mother told me that remounting the seating system on the mobility base and reattaching the batteries was "too much of a hassle." She said no one had asked about her transportation needs or lifestyle during the assistive technology assessment for her child. Another instance of underuse devices occurred with an augmentative communication device. After securing funding for an electronic communication product, I was dismayed to watch a teenager in a high school social studies classroom ask to have the expensive device removed so she could return to the homemade manual communication board mounted on a wheelchair laptray.

Indeed, the field of assistive technology can offer many surprises for the rehabilitation professional. In my experience, I can think of five such cases:

- In the early 1980s, when developing client-device matches, I looked for "uniaccess," the single, best way a person could operate a device. Since that time, I have been surprised to realize that people may need **"multiaccess"** because of certain life variables (e.g., people have good and bad days; someone may be a "morning," "afternoon," or "night" person; and a person may occupy more than one position (sitting, standing, etc.) during the period of time the equipment may be used.
- The concept of a "wardrobe" of devices was another surprise for me. Recommending one device is relatively simple; **but with a second or third device added to preexisting equipment, the determination becomes more complicated, with compatibility issues and decisions to be made regarding use of an inte-**

**grated controller for all devices or using an individual controller for each device.**

- Another surprise was the ethical considerations I encountered with persons and caregivers who insisted on using devices the rest of the team believed to be either too sophisticated or too low of a level for the client.
- High caregiver turnover was another surprise; as a result, I had to learn strategies to deal with continual training of new personnel.
- It is important to realize that **clients may be wary of technology and may prefer no device at all**. Thus, I often found myself having to recommend assistive technology devices that were not my first choices. Learning the art of compromise definitely became essential in my practice.

## Assuring Use of Assistive Technology

**Outgrowing a device and client death are, in my opinion, the only legitimate reasons for people to stop using assistive technology equipment.** To maximize use of assistive technology, rehabilitation professionals should reexamine the three stages of the assistive technology service-delivery process mentioned above. **Rehabilitation professionals can ensure current and future use of assistive technology devices by using two strategies: appropriate matching and long term follow-up.**

### APPROPRIATE CLIENT-DEVICE MATCHING:

**The appropriate matching strategy occurs during the client-device match determination stage of the assistive technology service-delivery process.** The match between each person and every assistive technology product—critical to current and future use of equipment—**must include the involvement of the client, the determination based on function, the considerations of the client, and the variables of the device**.

*Client Involvement*

An assistive technology match should be made on a **case-specific basis** by a team with the client (the person in need of the device and his or her caregivers) included as an active participant on the team. Mallik and Elder[1] found that **clients who participate in the design development and the evaluation process of assistive technology usually display commitment to use the device after delivery**. Active participation may also **provide the client with the motivation needed to learn about and then use the product**.

*Function-Based Model*

**The best match of adaptive equipment follows a model based on function rather than on diagnosis. The emerging field of outcomes management has three basic approaches: (1) Outcomes definitions and measurement; (2) clinical guidelines (the best approach); and (3) critical path analysis.**[2]

Employing primarily a **critical path analysis (protocols based on diagnoses rather than function) often leads to a mismatch between the client and the chosen techology; as a result, the equipment may never be used.**[3] For example, in some settings, each patient with a total hip replacement is provided with standard precautions about bending and sitting and is issued the same devices (e.g., long-handled shoe horn, reacher, and long-handled sponge). In those facilities, patients may not be asked about their equipment preferences or whether the devices, if provided, would ever be used. Most rehabilitation professionals realize that **clients with the same diagnosis will not have the same abilities and problems**, and view individual differences in functional ability

as factors that may result in recommending different combinations of assistive technology for people with the same diagnosis. **Before the critical path analysis approach gains momentum in the assistive technology field, rehabilitation professionals who specialize in assistive technology service delivery should make sure to outline clinical guidelines determined through consensus of recognized experts in the field so that measurable, functional outcomes can be achieved.**[1]

The team can evaluate function in many different ways. **In assessing functional status, it is helpful to view human performance in three dimensions: areas, components, and contexts.**[1] **The three performance areas of work, activities of daily living, and leisure/play are further subdivided into three performance components: sensory and motor abilities, psychosocial abilities, and cognitive abilities.** The context dimension adds temporal aspects and environment with physical, social, and cultural considerations. All human performance dimensions and the endless interrelations of the three dimensions can positively or negatively influence the person-device determination. Each person—rehabilitation professional or client—brings his or her knowledge, background, and expertise into the assistive technology service-delivery process.

*Client Considerations*

**When determining a client-device match, the rehabilitation team must consider the needs, expectations, and wishes of the client while assessing functional status. One key variable in providing the optimal match is to assess the client's current and future needs. The team should consider** not only the growth of the client but also **the growth of the device to match his or her physical (and sometimes cognitive) growth**. Another key variable is the **recognition that a client using adaptive equipment may need to access another person who also takes advantage of assistive technology**.

**The expectations and wishes of clients must be considered** as well. **An important feature of the client's situation may be overlooked by the rest of the team its significance is not communicated.** At times, the client may possess an idealized concept of the tasks that can be accomplished with assistive technology equipment and is disappointed when the device is delivered. **If the optimal match is impossible to make for a variety of reasons, compromise among team members may be the only solution to the client-device determination. For a client with a low tolerance for "gadgets," the answer may be the recommendation of no device at all.**

## DEVICE VARIABLES:

Device variables include **wardrobe fit, user support (maintenance, repair, and replacement), update policy, general health of the company, reliability, and costs of continuing education**.

One variable in determining the best assistive technology match is the fit of the proposed device into current (and future) adaptive equipment wardrobe. At times, the decision about a first device may be made quite easily. **The determination, however, becomes more complicated as the team considers the future assistive technology equipment needs of the client during the initial client-device match and assimilates the information about proposed equipment into the decision about the first device. When incorporating a new device into an existing wardrobe of equipment (power seating and wheeled-mobility system, electronic augmentative communication device, environmental controls, computer system with alternate access), the team must decide whether each assistive technology product will be**

**controlled by individual input devices or if the wardrobe will use one integrated controller that provides access to all the devices.**

In a recent study, Guerette, Nakai, and Sumi[5] found that **integrated controllers appear to be appropriate if: (1) The best method for controlling each assistive devices is the same; (2) the client has a single, reliable access [illegible]; (3) the performance on one or more device is improved; or (4) the individual prefers this single access method.** However, **integrated controllers may not be appropriate if: (1) The performance on one or more devices is degraded; (2) greater cognitive demands make use difficult; (3) access to other devices is desired from another position; or (4) the additional cost is not justified.**[5]

Availability of user support is another device variable to consider when determining the best client-device match. The amount and kind of user support varies with each type of assistive technology device. **Types of user support include maintenance, repair, and replacement. A toll-free telephone number staffed 24 hours a day, 7 days a week may be optimal service support for a computer access device; however, a telephone call may not be appropriate for power-seating and wheeled-mobility products, which may require a company to provide pickup service and a policy that furnishes loaned equipment while the device is being repaired.** In making the client-device determination, the team must decide whether the amount, kind, and availability of user support is appropriate.

The rehabilitation professional should also determine the manufacturer's **update policy. Whether a device can be updated, costs of updating, and changes in performance are all factors to consider when looking at update policies of assistive technology equipment.** The ability to update a device is important to a team that examines the current and future needs of the client.

Another variable to consider when choosing an assistive technology device is the **general health of the company selling the product**. This is **evidenced by years of operation, visibility as exhibitors at technology conferences, proven success, and reliance on soft money**, among other things. Dealing with healthy companies before *and* after the sale of the device is crucial because businesses "come and go" in the rapidly changing assistive technology field.

**Devices are sometimes selected without regard to the reliability of the equipment.** Recent studies in power seating and wheeled mobility systems found that certain types and brands had breakdowns less frequently than expected and other systems had more frequent breakdowns than expected.[5,7] Teams should examine the reliability of the device over time before making the final selection. **Brochures, information sheets, and videotapes are not always the best way to select a device for use; at least one person on the team should have prior experience with the product being recommended. If a team is unfamiliar with the device, a team member should ask the company that markets the product to refer the team to someone who has used the device over a few years.** Many companies compile lists of their successful users solely for this reason.

**The initial cost of an assistive technology device may include initial training and continuing education, initial training only, or no training at all. For some products, particularly electronic augmentative communication devices, initial training and continuing education are essential in assuring that the equipment is used as planned during the client-match determination stage.**

Even when the client-device match includes involved clients, a function-based decision, consumer

considerations, and device variables, the assistive technology product may be underused or unused. According to the Scherer MPT Model,[8] **the influences on the variable use of assistive technology can be grouped into three primary areas: (1) The characteristics of the milieu (environment and psychosocial setting) in which the device is used; (2) the pertinent features of the individual's personality and temperament; and (3) the salient characteristics of the assistive technology device itself. Use of an assistive technology device will be optimal if the milieu—*M*—provides support and realistic expectations; the person—*P*—is motivated, cooperative, optimistic, self-disciplined, and possesses the abilities to use the device; and the technology—*T*—is safe, reliable, easy to use and maintain, compatible with the use of other technologies, and the best option currently available.**[8]

**Partial or reluctant use of assistive technology, or even avoidance and abandonment of a device, will result if: (1) the milieu does not provide support; (2) the person is unmotivated, uncooperative, unrealistic, or has a low self-esteem; (3) the technology is inefficient, requires elaborate set-up, and interferes with the use of other technologies; or (4) any combination of MPT influences is deficient.**[8]

### LONG-TERM FOLLOW-UP:

**Long term follow-up is the second strategy to prevent nonuse or underuse of assistive technology devices. Immediately after the team makes the client-device determination, follow-up begins—seeking and obtaining funding for the device.** Although two necessary steps (training of clients and service of equipment) are considered during the client-match determination stage with the appropriate matching strategy, both steps are reconsidered while seeking and obtaining funds. Occasionally, assistive technology is funded and delivered, but the device is never unpacked because clients are not trained in the use of the equipment. Additional funds sought for assistive technology training are insignificant compared with the expense of the assessment and the price of a device that is left unused. **Because a poorly maintained or broken assistive technology product is neither the aim of the team nor the funding source, the original funding request should include the expenses of ongoing service from a reputable dealer.** These services should include **routine maintenance and cleaning to prolong the lifespan of the adaptive equipment as well as repair of dysfunctional assistive technology products.**

**The team must ascertain exactly what is involved in the price of assistive technology equipment before seeking funding. If the cost of a device covers only the product, the team should seek funding that includes the price of the assistive technology product as well as the costs of training of clients and servicing the device.** Even though some well-meaning professionals handle all of the assistive technology funding details for expediency, clients and their families may not realize the time required, trials involved, or even the dollar amount of the device requested. **Client involvement in the campaign to locate funding can be a motivating factor in the appropriate use of the assistive technology device after delivery.**[1] (The stage of seeking and obtaining funding is beyond the scope of this lesson; accordingly, readers are referred to several references[9-18]).

## Summary

Ensuring that persons with disabilities can live up to their maximum capabilities is the aim of rehabilitation professionals in service delivery. If assistive technology equipment is involved, the client-device link must work to its fullest potential. To decrease the incidence of underused

assistive technology devices. appropriate matching and long-term follow-up are two strategies rehabilitation professionals may use during the three stages (determining the client-device match. seeking and obtaining funding. and using equipment) of the assistive technology service-delivery process.

As for unused assistive technology. **some pieces of adaptive equipment are no longer in use because the person may have grown beyond the size or sophistication limits of the device**. Clients and rehabilitation professionals in some regions of the country have moved unused or unwanted assistive technology products to a central location for storage until they are loaned on long-term bases. Most clients are happy that unused equipment will go to "good" homes: such clients welcome suggestions of donating unused equipment to lending pools or libraries. **Wavering in the decision of whether to donate unused adaptive equipment, clients may be swayed by the added incentives of decreasing the clutter in their storage areas and taking tax deductions for the assistive technology devices.** Rehabilitation professionals can help keep assistive technology "out of the closets"[19] and provide an additional service by placing devices in the hands of persons who need the equipment.

Furthermore. rehabilitation professionals can decrease the amount of unused and underused assistive technology products in five ways: (1) Incorporating clients and caregivers into the team during evaluation and funding acquisition: (2) determining the optimal match between the client and the device: (3) conducting long-term follow-up: (4) encouraging local civic organizations to begin collection of unused assistive technology devices: and (5) seeking permission of clients and caregivers to donate devices to centralized lending pools.[20]

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## QUESTIONS BASED ON THIS LESSON

**13.** In the newly emerging field of outcomes management, one approach that may limit quality in assistive technology delivery is:

A. Outcomes definitions and measurement

B. Clinical guidelines

C. Critical path analysis

D. None of the above

**14.** Which of the following statements is false?

A. Recommending that no assistive device be used once a client-device match has been completed thoroughly is never recommended, even if the client exhibits an aversion to technology, because that client will ultimately be harmed by such a decision.

B. In assessing functional status, it is helpful to view human performance in three dimensions: areas, components, and contexts.

C. Outgrowing a device and client death are perhaps the only legitimate reasons for people to stop using assistive technology equipment.

D. It is necessary to ascertain the general health of the company selling an assistive technology device when investigating various device variables.

**15.** Which of the following should be considered when determining the best client-device match of assistive technology?

A. Availability of user support

B. Whether the device will need to be updated and the manufacturer's policy on such upgrades

C. The relative health of the supplying company

D. All of the above

**16.** Use of an assistive technology device will be optimal if:

A. The milieu provides support and realistic expectations

B. The person is motivated, cooperative, optimistic, and possesses the abilities to use the device

C. The technology is safe, reliable, easy to use and maintain, compatible with use of other technologies, and the best option available

D. All of the above

REHABILITATION TECHNOLOGY REVIEW

LESSON 5

# Ethical Considerations in Rehabilitation and Technology

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Professional Advancement Series

Presented by *Directions in Rehabilitation Counseling*

## Key Points

- Technology can be defined as "practical outcomes derived from scientific knowledge." This term is variously associated with high cost, increased efficiency, the distancing of human beings from each other, overdependence on machines, and progress.

- *Full* technologies are highly refined, work efficiently, and are available at low cost. *Half-way* technologies are partially refined, yield low outcomes, and are available at high cost.

- The use of technology in rehabilitation is not value-free; basic assumptions are formed about the purposes that the technology should serve, which values should be protected or fostered, and why. Thus, the context of decisions associated with these assumptions are extremely important.

- Ethical principles of the rehabilitation profession are rooted in respect for the client's human dignity. Accordingly, professional ethics in rehabilitation are more *deontological* (i.e., the means are as important, or even more so, than the ends) than *utilitarian* (i.e., dignity may have to be compromised for some better consequences overall).

- *Beneficence* requires that rehabilitation professionals strive to further the best interests of the client. *Autonomy* means that the client has a right to be an active participant in the decision-making process of his or her treatment plan. The use of technologies must be guided not only by their effect on the professional's ability to be beneficent, but also on the client's ability to remain an active determiner of his or her own well-being.

- The most frequent criticism leveled at the use of technology in rehabilitation is that it draws attention away from the client's experience as a whole and on to his or her affected part or disease. Therefore, it is imperative that the rehabilitationist strive to incorporate compassion into the rehabilitation plan so that attention is deflected from the affected part or disease back onto the client.

## Introduction

Most rehabilitation practitioners would agree that the profession has become increasingly technology dependent. But simply to acknowledge that these professions have incorporated more technologies into their practice does little to shed light on ethical issues that are arising as a direct result of rapidly emerging technology. This lesson is designed to help the counselor better understand ethical issues in the use of rehabilitation technology. Its purpose is threefold: (1) To examine the idea of technology; (2) to describe basic ethical principles that act as guides for practice in rehabilitation and other related professions; and (3) to discuss how rehabilitation technologies can foster *and* hinder rehabilitation professionals in their goal of maintaining high ethical standards of care.

## What is Technology?

**Technology generally can be defined as practical outcomes derived from scientific knowledge.** When we speak of "applying technology," we refer to the **application of products or procedures made possible by the use of scientific investigation**. A single product or procedure can be viewed as a technology. Beyond that, the idea of technology often is associated variously with **high cost, increased efficiency, the distancing of humans from each other, overdependence on machines, the means of modern miracles, and as a marker of progress in the modern world**. Any such idea about the role and power of technology in general may be characteristic of a given technology, but not of all technologies.

### TECHNOLOGY AS VALUE-LADEN:

For this and other reasons, technology is a topic of intense study today. Jacques Ellul, a French philosopher who has become the most persistent proponent of the position that technology is "the central condition of modern society," may be the pioneer of this area of investigation. In his prolific writings, **Ellul[1] views technology as a behemoth that defines our values, limits our possibilities, and, overall, charts our future.** Other writers are more optimistic, and many reserve judgment.

In the quest to understand the influence of technology in our everyday lives, some writers attempt to distinguish among different types of technological products and processes. The language of "high technology" and "low technology" is helpful, if only in a limited way, because it reflects the idea that **technology does not exert a neutral influence over the quality of our lives**. In using these designations, more value is almost always assigned to one type over the other.

### TECHNOLOGY AS DYNAMIC:

Thomas[2] differentiates "full technologies" from "half-way technologies." **Full technologies are products or processes that are highly refined, work efficiently, and are available at low cost. Half-way technologies are only partially refined, yield low outcomes, and are available at high cost.**

**A half-way technology often evolves into a full technology**[3]: the development of antibiotics during World War II is an example. Initially, antibiotics were crude "bullet drugs," rationed at high cost. Today, their use is highly refined, in large supply, and at a cost available to almost everyone. At the other extreme, medical imaging equipment such as the positron emission tomography (PET) scan is still exorbitantly expensive, with an "improved" model becoming available every 2 or 3 years.

### TECHNOLOGY AS CONTEXT-DEPENDENT:

Suppose a given rehabilitation professional wants to make a judgment about a technology developed for a particular purpose. As the above paragraphs suggest, he or she must remember that **decisions concerning the use of a rehabilitation technology are not value-free, and that any technology itself may change over time (for**

**better or worse)**. But he or she will not be able to make this judgment without some **basic assumptions about the purposes that technology ought to serve, which values ought to be protected or fostered, and why**. Thus, **the context of this decision becomes very important.**

## Respect for the Person

Ethical foundations of any profession are embedded in codes of ethics. The overarching ethical principle in these documents is respect for the client as a person—that is, **respect for human dignity**. Therefore, rehabilitation counselors should approach an ethical analysis of rehabilitation technology with a focus on **how it will affect the client's dignity**.

This notion has deep **religious and philosophical underpinnings**. The Judeo-Christian tradition holds that all humans are children of God; of all living creatures, they alone are made in God's image and therefore have an inherent dignity that sets them apart from all other beings and things.

The secular justification for the dignity of the individual took shape during the Enlightenment. Although Kant, an 18th-century German philosopher, did not deny a religious source of dignity, he did not use it as a basis for his own advocacy of this notion. Kant was influenced by other Enlightenment thinkers who focused on the **individual human as the center of all value and worth in the universe**. Therefore, he emphasized ways in which human dignity is different from the dignity of anything else.

**Kant reasoned that a human being is distinguished from a "thing" in that it has inherent worth (beyond price), whereas the dignity or worth of "things" can be measured only by the extrinsic value given to it by human beings.** Everything but a human has a price. In the human—and human only—dignity is absolute rather than relative.

The idea of respect for human dignity has led to the development of "rules" or "principles" that are believed to reflect such respect. In this regard, professional ethics are **more *deontological* than *utilitarian*. A deontologist believes there are certain types of conduct or moral rules that cannot be ignored when considering what is right or wrong**. (The greek *deonto* means "duty.") **The means are as important, or more important, than the ends.** I cannot justifiably use a given technology if my action (or that which the technology fosters), harms the basic dignity of the person even though some desirable results might be realized in the end.

**A utilitarian ethic, on the other hand, believes that what is right can be discovered only by weighing the consequences, and then choosing that which will bring about the most positive consequences overall.** Because **the ends are what matters rather than the means**, human dignity should be protected by thinking about the consequences of one's acts. A utilitarian believes that **there are times when dignity may have to be compromised for some better consequences overall**.

There are more sophisticated forms of these two basic ethical theories, but it goes beyond the scope of this lesson to elaborate on them. Relevant to our study is that the professional codes of the rehabilitation (and other) professions follow the thinking of a deontological ethical framework; these codes note that respect for persons cannot be compromised for some other positive end.

## Ethical Principles Used to Foster Respect

Because respect potentially entails so many different behaviors and attitudes, the professions have understandably tried to develop "markers" for judging that such respect is being shown. Three key additional ethical principles are among the most important tools employed for this purpose.

***Beneficence*** **requires that professionals strive to further the best interests of the client.** ***Autonomy*** **maintains that the client has a right to remain in control over key aspects of his or her own life and well being.** ***Character traits*** **or** ***virtues*** **are means of communicating respect. Some common examples are compassion and honesty.**

## BENEFICENCE:

The principle of beneficence establishes a special obligation on the part of the professional diligently to seek the well-being of the client. This requires, among other attributes, **competence, good will, and perseverance. The duty to be beneficent must take priority over other goals**—such as making an important discovery—**that do not help the client, but may help others in the future**.

For example, involving a client in a clinical research experiment that you know will not directly help him or her, but which, you believe, will lead to important information that may help numerous other clients in the future, cannot be justified if it substitutes for interventions focused directly on that person's well-being. However, the counselor may try an experimental device, medication, or other intervention as a last resort measure to attempt to help the client when all else has failed. Even so, **the person's informed consent is required so that he or she is well aware of the situation**.

In the history of rehabilitation, it was safe to assume that doing everything possible for a person was more likely to be consistent with a duty of beneficence than holding back interventions. But today, for the first time, **beneficence may entail doing less rather than more, because technology has made so much possible. Rehabilitation professionals are thus faced with the challenge of determining where the technologically possible and proper moral limits of intervention intersect.**

Modern Western societies have witnessed the power of technology to extend human potential and to make the humanly impossible possible. This can be a mixed blessing in some professions. Rehabilitation professionals, legally and morally bound to try to do what is best for clients, are acutely aware of the multiple possibilities for intervention in almost every condition they encounter. Thus, today's professionals face a uniquely modern dilemma not experienced by their predecessors: **the challenge is to judge when "enough is enough" in the face of the possibility of further interventions.**[3] **Especially when the client manifests an intractable deteriorating course that involves suffering, loss, and debilitation, the moral imperative to do what is best for the person combined with the knowledge of still-unused technologies often is experienced as a "technological imperative."**[4]

One philosophical orientation holds that in some situations, "is" implies "ought": the mere presence of some fact dictates exactly how human beings should respond to it. The rehabilitation professional's awareness of an available technology is a good test of this conviction. **Professionals often interpret the availability of technology as a** ***moral*** **claim, urging in the direction of intervention, even when no such imperative actually exists.** That is, the use of what is technologically possible seems to be morally mandated on the basis of the presence of that technology alone.

The professional's perception that availability entails a moral claim is compounded when patients or clients (and their families), believing that "the machine will help when the professional cannot," urges the professional to try one more intervention.[5]

In addition, one of the most perplexing aspects of this apparent moral claim is that **the client's problems may present as deceptively small and remediable when in fact they are not. In such cases, it seems that there is every reason to support a professional's decision to apply numerous technological interventions to address each problem as it arises. However, although each individual intervention may fall within usual and**

**customary practices and procedures and may be based on acknowledged, scientifically substantiated findings, the client may become an object of "assault" in that *too many* interventions are applied.** The professional must reconsider the efficacy of continuing with escalating interventions, however successfully they may be alleviating specific problems.

At some time, almost all rehabilitation teams and individual professionals today are drawn into artful "spot-welding" attempts to mend the damage as each problem appears to spring from the very seam of the previous one, even as the dignity of the person continues to crumble under the activity. The perplexity is exacerbated because, as each new complication arises, the incentive to proceed assumes the power of a moral claim.

## AUTONOMY:

One response to the conundrums caused by the increasing availability and use of technology has been to **turn to the client as a partner in the decision-making process**. This common-sense solution is sometimes difficult to follow, especially if the practitioner is particularly mindful of his or her duty to be beneficent. In the history of the professions, the professional was viewed as a benevolent trustee of the patient's or client's well-being. The professional, guided by the duty of beneficence and assumed to have special information the person cannot have, was "in charge." But this attitude and practice has been changing in contemporary practice.

The principle of **autonomy, the freedom to determine the course of the important events in one's own life**, provides a philosophical foundation for seeking this partnership on the basis of human dignity. Kant says that when we honor other persons' autonomy, we are treating them as "persons with the same right to their judgments as we have to our own...not for a utilitarian or any other reason except that another is a person and therefore a rational determiner of his or her own destiny."[5]

The health professions have led the way in creating the mechanisms of informed consent, which are designed to bring the client into the decision-making process. The idea of informed consent arose in the clinical practice of medicine in the 1950s from the emerging belief that autonomy was a patient's right. **(A right is a stringent moral claim that a person or group has, and which should be protected.)**

The interpretation of this right has evolved from meaning that **the client has the prerogative to refuse intervention**, to a right to play a central role in determining the course of intervention. In 1990, Congress passed the **Patient Self-Determination Act, which removed autonomy further from the realm of a theoretical ethical principle and into the legal arena**. This piece of legislation mandates that **patients be given the chance to express their preferences regarding limits on health care interventions in life-threatening illnesses and conditions.**

**Although no direct application of this mandate applies to the rehabilitation professions, many practices reflect aspects of this medical model geared to honor client autonomy.** There are some important differences as well. For example, **once rehabilitation goals are set and agreed upon by the client, the rehabilitation team takes charge of tailoring a program they believe to be consistent with the constraints imposed by the person's disability and with societal and team values**. Because rehabilitation is an evolutionary process, the divergence from what the client thought he or she authorized may increase and go unnoticed for some time once the initial goal-setting sessions are complete.

**The challenge of continuing to honor the client's autonomy is further complicated by six factors** inherent in the rehabilitation team's interaction with the person:

- **The "can't turn back now" factor**. The person is too invested to back out or change the course set by the rehabilitation team.

- **The fatigue factor**. The person is too exhausted by multiple activities and team members' interventions to envision or seek alternatives.
- **The anxiety factor**. The person is likely to be conservative in his approach to new ideas. People often lose imagination, creativity, and courage to seek new solutions under stress.
- **The gratitude factor**. The person is thankful to the team for its care and does not want to hurt the feelings of the team members by disagreeing with their proposals.
- **The reasonable expectation factor**. The team appears to demand cooperation from the person.
- **The team numbers factor**. The person feels outnumbered...it's ten or twelve team members against one client.[8]

In the face of all these challenges, the right to autonomy morally requires that the rehabilitation team seek to honor values that the patient or client can identify with to complete the rigors of the rehabilitation process successfully. Although it goes beyond the scope of this paper to elaborate strategies in detail, one important step is that the team seek to understand the person within the context of his or her life situation and support systems so that the person will find meaning and sustenance in trying to work toward the agreed-upon goals. Naturally, **open and frequent communication** about goals also helps.[9]

The presence of rehabilitation technologies often intensifies the challenges to autonomy that the rehabilitation setting itself imposes.[10] In his book *The Machine at the Bedside*, Reiser[11] reflects on the ethical dilemmas for autonomy posed by the introduction of technology into health care. He reminds the reader of Karen Ann Quinlan, a 21-year-old woman who collapsed and ceased breathing for at least two 15-minute periods during a party in April, 1975. She was rushed to a hospital and immediately placed on a respirator to maintain her breathing, where she remained for many years. He observes:

> In the debate about what should happen to Karen Quinlan, the respirator became a symbol of both the advanced technology of modern health care and the ambivalence toward it that many were coming to feel. *Once turned on, the respirator seemed autonomous*, its power to save life matched by its power to torment life...It was this machine that showed that in health care, the creation of technological capacities must be matched by the development and use of ethical canons of direction. [Emphasis added.][11]

Reiser's observation of the machine as having its own power to set the "correct course" in health care equally can be applied to the rehabilitation profession.[12] We have already seen in the idea of the "technological imperative"—the power of the machine to call out for use, simply because it is there. But it also has a power to continue to "negotiate" for use—has a life of its own—once initiated.

Cassell,[13] likening technology to the sorcerer's broom that took on a life of its own, suggests several reasons why professionals continually must evaluate the appropriateness of technology against the "ethical canons [i.e., principles] of direction" to which Reiser refers in the above excerpt.

Cassell proposes that **technologies are used because they help to relieve the professional's anxiety about not knowing exactly what to do in some situations**. Almost every professional dreads being in a position of not knowing what, if anything, will help those clients who entrust their well-being to professionals. **The machine is concrete; it appears that something is being done simply by the application of the technology.** In the process, there is the danger of trimming the client to fit the technology rather than tailoring the technology to some needs of the person.

**A second misuse results from what Cassell calls the "lure of the immediate":**

> The numbers of the readout, images on film, dexterity required for its deployment, technical complexities, tubes, wires, plugs, valves, needles, gauges, mirrors, focusing devices, and on and on exist in the here and now—the immediate moment. But these things are immediate in another related but perhaps more important sense.

> They are unmediated by our own reasoning. The technological output is a thing in and of itself....How different from the patient. A bundle of large questions, a life that exists only in the most fragmentary sense in the here and now.

Good or bad, as measured by responsiveness to technology, is not necessarily the same thing as good or bad for the client's dignity as a person. Refusal of a prosthetic device, for instance, may seem silly to the counselor, but the client may find it too unsightly, unnatural, or expensive. **The client's life situation is the standard by which the appropriateness of the technology must be measured.** It is this consideration of the client's situation that often is termed "**quality of life**" in the medical literature.

## CHARACTER TRAITS/VIRTUES:

The most frequent criticism leveled at the use of technology is that it "distances" professionals from clients. By "**distancing**," most writers mean that **technology inevitably draws attention away from the client's experience as a whole person and on to his or her affected part or disease**.[14] This is not an unfounded worry. One study shows that as technology fails to create an overall positive outcome, professionals cling ever more tenaciously to the smaller successes, a version of the old adage that "the operation was a success but the patient died."[15] However, May[16] accurately notes that **the recipient views *all* (not just technological) professional interventions as *means* rather than as ends**. Therefore, technology is not distinct in being a tool that deals with only a small portion of the whole person.

The trait of **compassion**, literally translated as meaning "**to suffer with**," provides one resource for the professional. If compassion is cultivated and practiced, the focus on the person's suffering will help to **deflect attention away from the affected part or disease and back onto the whole person**.

**In *mute suffering*, the person is so confused by the enormity of the change in his or her life that he or she cannot interpret the cause or nature of the suffering. In this phase, compassion involves listening for clues that might assist the client to interpret his or her distress. Assurance that the professional will not abandon the person at this time is essential.**

**In the phase of *expressive suffering*, the person begins to focus and cope more actively with the suffering. Anger, searching for alternatives, and reasserting autonomy characterizes this phase. In this case, the compassionate professional becomes a partner in the search for alternatives.**

**In the phase of *new identity in suffering*, the client transforms the meaning of the incident into a new framework and begins to look ahead to new possibilities in an altered state of body or mind. The compassionate professional continues to listen, provides support, and enables the client to reintegrate into society.**[17]

Because the rehabilitation process itself rests on the assumption that clients can draw on their inner power to overcome tragedy (e.g., the knowledge of serious illness or injury, or of irreversible damage to the body or mind), the professional who is willing and able to express compassion in its various forms during the client's rehabilitation will be a source of great encouragement and support. Moreover, without compassion, the crucial ethical guideline of protecting the client's dignity will be exceedingly difficult to achieve, whether or not the use of modern technologies are employed.

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## QUESTIONS BASED ON THIS LESSON

17. Which of the following statements is true?

    A. The idea of technology is never associated with the distancing of human beings from each other.

    B. Full technologies are partially refined, yield low outcomes, and are available at high costs.

    C. A half-way technology rarely evolves into a full technology.

    D. Kant reasoned that a human being is distinguished from a "thing" in that it has inherent worth (beyond price).

18. With respect to ethics, a deontologist would differ from an utilitarian by saying:

    A. The means are as important, or more important, than the ends.

    B. There are times when dignity may have to be compromised for some better consequences overall.

    C. Kant's ethical theories are obsolete.

    D. It is not necessary for rehabilitation professionals to include clients in the decision-making process.

19. The belief that rehabilitation professionals should strive to further the best interests of the client refers specifically to:

    A. Beneficence

    B. Autonomy

    C. Virtue

    D. Compassion

20. Which of the following statements is false?

    A. The client's life situation is the standard by which the appropriateness of the technology must be measured.

    B. The purpose of employing compassion when working with clients who must use technological devices is to deflect attention away from the client's affected part or disease and back onto the client as a whole person.

    C. In expressive suffering, the client transforms the meaning of a particular incident into a new framework and begins to look ahead to new possibilities in an altered state of body or mind.

    D. In mute suffering, the person is so confused by the enormity of a certain change in his or her life that interpretation of the cause or nature of the associated suffering is difficult without assistance.

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